

SECTION III

**Public policies and support of  
agri-food sector**

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**The role of the Food Safety Management System of**  
**Uzbekistan for developing an agri-food system**

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## **Introduction**

After independence from the Soviet Union in 1991, to be a member of world organizations and to cooperate with such kind of organizations has been one of the main objectives of Uzbekistan. Uzbekistan has been trying to be a member of one of the prestigious organization of WTO since 1994. Based on GOST systems is not wholly respond to the requirements of world trade food production. So to transit systems that based on WTO is important and the Food Safety Management System of Uzbekistan bases on transition export orientation agricultural food production.

In this study, we described controlling the quality of food production on governmental, regional and individual and the effect of the management system on the food production market.

## **Data and Method**

The data is based on international and legal documents, as well as individual researches. Besides we used some statistical data on food production in Uzbekistan.

## **Main results and conclusions**

As a result of our analysis showed that the role of the Food Safety Management System of Uzbekistan for developing an agri-food system is significant. The development of the Food Safety Management System will be a strategic superiority of the regional food market, as well as it will help to hasten to be a member of the WTO.

The food safety management system of Uzbekistan consists of two units:

1. Governmental
2. Non-governmental.

Main directions of improvement of food safety management in Uzbekistan

1. Safe management of raw materials: Save cultivation environment ( Soil, fertilizer, pesticide, etc); safe harvest (Potato harvest under sunshine).

2. Strengthening of quarantine and hygienic investigation for imported and exported foods: Increment of international trade of agricultural products; increment of exported foods for quarantine and hygienic investigation; rapid and scientific processes are needed; the need for the establishment of the reasonable and effective quarantine processes; effective hygienic investigation including food poisoning sources and safeness of preservation condition, etc; collect the hazardous information from exporting countries.

3. Easy to establish for food regulation: Single service window to consumers and industries; exclusion of overlapped business; improvement of services to consumers and industries;

effective regulation for food safety; systematic prospects for food safety problems related to the food chain; enhancement of financial support for food research and food industry.

4. Easy to establish of supporting programs for food industries (Good processed foods are produced from industries with good facility HACCP): Easy to certify the weak points of the industry under the steep regulation system; feedback about the weak points to industries; easy to discuss the supporting plan with industries

5. Supply with good and safe foods to consumers; environmental friendly agriculture products from farmers are welcomed by consumers; GAP products

Processed foods under the HACCP program are also welcomed by consumers; good and safe foods are welcomed by imported country consumers.

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**Global Practices in Agriculture Knowledge and Innovation System:**  
**Lessons for Uzbekistan**

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Anation's Agriculture Knowledge and Innovation System (AKIS) is vital in increasing agriculture sector productivity, market orientation, and modernization, and ultimately rural resilience. Effective design and operation of an AKIS increases the transfer of information, knowledge, and technology to all agricultural producers, improving their wellbeing. Uzbekistan's agri-food development strategy for 2020-2030 recognizes the role of an effective knowledge and innovation system for increased productivity and rural development. Accordingly, one of the priorities of the agri-food Strategy is the design of an effective and modern AKIS roadmap by 2021. This paper explores global practices in AKIS, with the aim of contributing to lessons for Uzbekistan's AKIS development. The paper discusses essential aspects of an effective AKIS in five areas: coordination, decentralization, financing, client's participation, and professional development. The article, however, highlights that it is up to each AKIS manager to decide what is best-fit in their own context, taking account of the nature of the sector challenge, the clients' demands, and the resources available.

## **2. Research questions**

The study has three research questions:

- What are the important variables for a successful AKIS?
- What does the traditional AKIS in Uzbekistan look like?
- What are the long-term future priorities of Uzbekistan's AKIS
- What global lessons exist in AKIS planning and implementation, for Uzbekistan to learn

from?

## **3. Data and methods**

The paper is part of a policy brief prepared for the Centre for Policy Research and Outreach at the Westminster International University in Tashkent. The information presented in the paper are based on:

- Assessment of Uzbekistan's historical and current AKIS practices, using secondary data and interview of actors in February 2020
- Review of the motives and AKIS priorities in the Uzbekistan Agri-food development strategy for 2020-2030
- Review of global experiences of relevant agrarian nations AKIS
- Identification of some best-fit AKIS lessons for Uzbekistan's context

## **4. Main results**

The world has tried various broad Systems where agricultural producers, researchers, education, information, extension, support systems and regulatory policy operate complementarily (known as AKIS). Good AKIS practices are those that ensure the extensive and effective introduction and use of agricultural innovations by producers (Rivera et al. 2005). Below are five AKIS practices that offer 'best-fit' options for Uzbekistan.

### **Stakeholder Coordination is vital**

Uzbekistan has multiple actors that have varied stakes in the development of the agriculture sector. The actors include public institutions, civil society, private entities, donors, and large and small farms enterprises. Such a pluralistic context is effective and efficient if well-coordinated and managed. Multi-stakeholder coordination ensures an increase in geographic and client coverage. It recognizes the potential contribution of the diverse actors in reaching-out farm clients, prevents duplication and fragmentation of efforts, ensures synergy among the co-existing actors, guarantees financial sustainability and policy coherence. The coordination platform is influential if institutionalized, managed, moderated, and facilitated at a higher-level state management structure (Rivera & Alex 2004; Sulaiman & Vamsidhar 2015).

### **Decentralize AKIS governance cautiously**

Uzbekistan aspires a decentralized AKIS governance, involving local structures. A truly

decentralized AKIS administration and management provides local people with influence over the local context. Yet, global evidence on the impact of decentralization signals that it needs to be dealt carefully. While decentralization is potentially important, in some cases, it increased cost of services, while doing little to improve local disparities and it led to greater inequalities in allocation of public resources (World Bank, 2000; Seepersad & Douglas 2002). A decentralized AKIS is effective only if the implementing structures have decision-making autonomy, transparent and accountable systems, and adequate physical, financial, and technical capacity (Davis et al. 2018).

### **Realign Public financing for increased sector performance**

Uzbekistan's public agriculture expenditure has historically been directed mainly to production of cotton and wheat, rather than transformation of the whole sector (Izvorski et al. 2019). The needs of many small-*Dehqan* farms in horticulture and livestock production are rarely addressed by the public finance (Zoriya et al. 2019). Global experience shows that public expenditure that focuses on broader sub-systems and capacity for agriculture performance and transformation (like agricultural research; farm advisory and information services; education; farmers cooperatives and market infrastructure) is a profitable investment and promotes service delivery to small farms. Public financing in AKIS is both economically and socially important especially if most farming communities are resource poor, illiterate, have little access to other information sources, and where private service providers are scarce (Gebremedhin et al. 2009).

### **Participatory approaches are inclusive and effective**

Generally, Uzbekistan's agricultural production and management decisions are based on little feedback and involvement of the client- the agriculture producers. Small farmers are seldom heard at policymaking level, given the limited influence of the farmer organizations/ Council (Kazbekov & Qureshi 2011). In a participatory AKIS, the clients (farmers) are consulted by service providers and researchers about their problems, goals, and preferences. Also, producers are asked about their agricultural practices, local knowledge, and for their perceptions of a new technology or policy (Gonsalves 2005). An assessment of participatory approaches in Africa reveals that they are cost-effective, facilitate rapid mobilization and changes among communities, and meet actual user needs. It also empowers producers to perform some roles of the service providers like trainings, demonstration, and facilitation (Spielman 2008). In participatory methods, the service provider or researcher is no longer the only expert who has all the information and solutions. Rather, all clients including women and youth, individually and collectively, are given space and are recognized as major resources to solve local problems (Davis et al. 2018).

### **Professional Development is key for advancement**

Most AKIS personnel in Uzbekistan have limited functional skills in communication, management, participatory methods, gender analysis, business planning and facilitation and limited use of English (widely used foreign language) to acquire international knowledge. Globally, the mandate of AKIS institutions has been expanding and evolving to address and contribute to the diverse and complex national and global goals and commitments like the Sustainable Development Goals (SDGs). For instance, AKIS is expected to contribute to gender equality in agriculture, inclusion of young people in rural development, poverty reduction and nutrition security, food safety, family reproductive health, and recently, mitigating the impact of the Covid-19 crisis. Repeated short-term and on- the- job trainings (or long-term education) for personnel are key to responding to the evolving and diverse mandates of AKIS, that go beyond the technical knowledge and skills in agriculture production (Davis et al. 2018). Trainings in required competencies are powerful if followed by mentorship, coaching and study visits to successful experiences. Practical experiments and demonstrations during a farming cycle also complement theoretical trainings. It is prudent to tap into the existing domestic and international expertise and synergies for professional development.

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**Scientific and methodological basis of using economic analysis to**  
**increase the efficiency of agriculture**

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**Annotation:** This article describes the scientific and methodological basis for the use of economic analysis methods to increase the efficiency of agriculture. The article describes the practical application of the methods of economic analysis in agriculture on the basis of the requirements of modern economics and the practical aspects of the analysis of statistical reports on the basis of modern methods.

**Keywords:** agriculture, efficiency, economic analysis, method, report, horizontal, vertical, trend, percent, indicator.

The role and importance of economic analysis in the agricultural sector in the process of further development and liberalization of the economy of our country is great. This is due to the fact that the assessment of the level of production efficiency, taking into account the specifics of the industry, identification of factors affecting it and calculating their impact, search for unused opportunities and ways to overcome existing problems in the industry are carried out using economic analysis. Analysis is the Greek word for “division”. Analysis is the process of breaking down integrity into parts and studying them in terms of their interdependence and interdependence, and of knowing the objects and phenomena of the environment”. [1]

It will also be possible to implement the most effective management practices based on the results of economic analysis. In particular, as noted by the President Sh.M.Mirziyoyev, “... the most important thing is to reform the management system of the agricultural sector, the introduction of advanced technologies for the rational use of land and water resources, food security it is our duty ”[2]. In addressing these priorities, it is important to use the scientific and methodological bases of economic analysis and improve them at the level of modern economic requirements. It is necessary to radically improve the system of agricultural management and introduce new techniques and technologies to increase efficiency through the formation of a qualitatively new structure, the creation of innovative products, the expansion of structural changes. This is because these processes are important factors in ensuring efficiency in the network and require constant analysis of the impact of their dependence on the performance of the operating entities. Not only economic factors, but also natural phenomena have a strong influence on the effective management of the activities of entities operating in the agricultural sector in the cause-and-effect relationship, which goes from simple to complex, from bottom to top, from quantity to quality. shows. In accordance with the requirements of the ongoing reforms in our country, the main task of the agricultural sector is to meet the growing needs of the population in food products, industrial raw materials.

Our research also shows that the successful development of many industries, the growth of national income, the increase in the material well-being of the population are directly related to the increase in the production of quality agricultural products. It is recommended to use analytical methods on a scientific basis in order to fully exploit the possibilities of economic analysis in the search for opportunities and their effective implementation in practice.

The definition of the method of economic analysis is given by many economists, in particular, in the theoretical sources created by Osmolovsky V.V, Bakanov M.I, Sheremet A.D, Vakhobov A.V, Ibragimov A.T, Ishankulov N.F, Pardayev M.K [3,4,5 , 6] in all of the definitions given, a general similarity is observed.

Based on the definitions given in these sources, we can conclude that the method of economic analysis is to determine the rate of change, the causes of their change by processing the system of indicators reflected in the sources of economic information using special methods, the relationship between thema and it is a systematic, complex study, measurement, and generalization of differences. We also recommend that the following features of the analysis be taken into account when using economic analysis methods in agricultural practice

✓ the analysis examines not only change and development, but also its cause-and-effect relationships. Therefore, it is important to identify the indicators and the units that affect their change;

✓ it is possible to predict not only the results of the causal relationships of the analyzed indicators, but also their future prospects. It is recommended to check the scientific validity of future plans;

✓ the analysis clearly shows the interaction and correlation of the studied indicators. This means that an important feature of the economic analysis method is that a particular economic indicator under study is not analyzed in isolation from other factors, and their interrelationships must always be taken into account.

Our research shows that in the agricultural sector, mainly generalized indicators are conducted in the statistical departments of the region using traditional methods of economic analysis (comparison, averages, index, absolute and relative indicators). is coming. As a result, the economic activity of each entity operating in the industry does not meet the requirements of today's economy. The efficiency of agro-clusters created in the network directly depends on the volume of production, costs and quality of agricultural products. Therefore, we consider it expedient to establish economic analysis centers in each agro-cluster, and recommend the following methods of economic analysis, which are widely used in international practice, in particular, in the industrial, commodity exchanges and financial markets of our national economy:

- method of reading the reports
- horizontal analysis method;
- method of vertical analysis;
- trend analysis method;
- method of financial ratios.

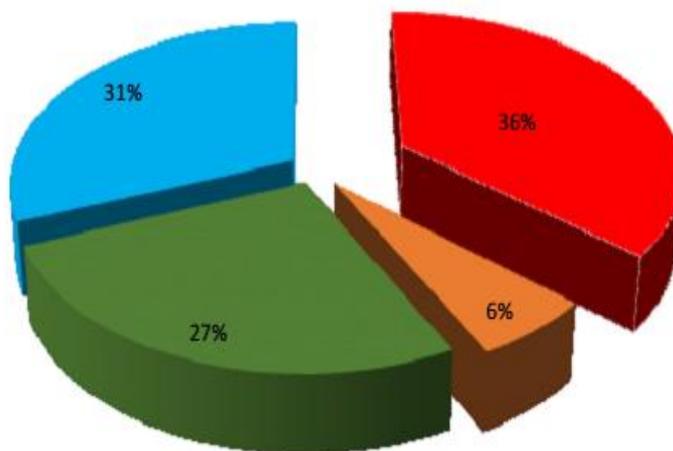
This is because these methods are easy to apply in practice, are based on open reporting indicators, are implemented in computer programs, and have a high ability to analyze the results. The method of reading the reports allows to analyze the indicators expressed in the reports on the basis of vivid imagination, logical thinking and practical stages of economic analysis. This method allows you to compare changes in reporting over time.

The method of horizontal analysis allows to identify and evaluate the absolute and relative changes of the actual indicators expressed in the reports in relation to the basic (basic) indicator (plan, last year, average, advanced farms). The method of vertical analysis allows to study the composition or structure of the indicators, which allows to study one or more indicators in more depth. In practice, this method is calculated by determining the amount (value) of the selected indicators relative to the amount (value) of the total indicator, and the results are analyzed analytically.

The trend analysis method is to determine the growth or decrease rates in each year interval in absolute and relative changes by comparing a series of indicators for several years with the selected base year or the following year in series, and in simple graphs and diagrams. The method of financial ratios allows to estimate the change in financial statements in ratios, and the use of this method requires attention to the criteria set for each ratio.

Below we present some of the results of our analysis of the main economic indicators of Kashkadarya region in 2019 using the methods recommended above. It is known that the growth of gross regional product (GRP) in the region is directly affected by growth rates in all sectors. In particular, when analyzing the data of the regional statistical bulletin using the method of reading the reports of economic analysis [7], the growth patterns observed in the main sectors of the regional economy in 2019 served as a key factor in GRP growth. In particular, agriculture, forestry and fisheries - 101.6% (share in GRP - 36.4%), construction - 110.2% (6.1%), services - 106.7% (26, 5%). The growth rate of the industrial sector decreased to 94.4% (31.0% of GDP), which can be positively assessed.

However, the report shows that the share of the agricultural sector in the study of the share of industries in the structure of GRP by the method of vertical analysis of economic analysis is 36.4% and its economic growth rate in the study period was 101.6 percent. (Figure 1)



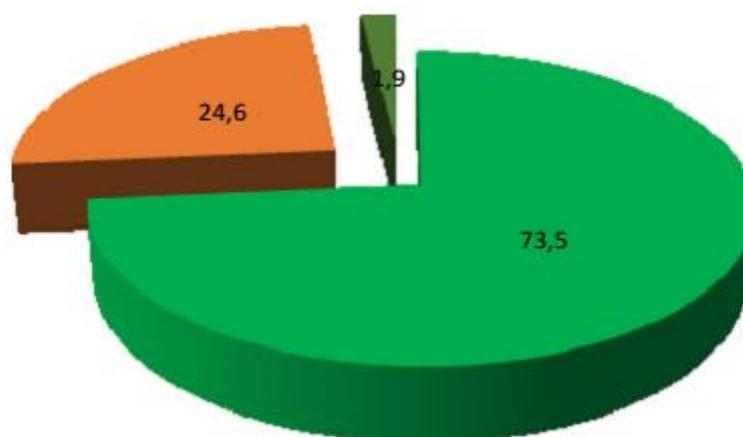
■ agriculture, forestry and fisheries   ■ construction   ■ construction   ■ industrial

**Figure 1. In 2019, the growth of GDP in Kashkadarya region contribution analysis**

According to preliminary data, the total volume of agricultural, forestry and fishery products (services) in the agricultural sector of Kashkadarya region in January-December 2019 amounted to 20417.1 billion soums or in 2018. The growth rate compared to the same period last year was 101.5%, including agriculture and livestock and services in these areas - 20044.8 billion soums (101.5%), hunting - 0.2 billion soums. (102.5%), forestry - 314.2 billion soums (103.2%), fisheries - 58.9 billion soums (101.3%).

These economic indicators were influenced by objective reasons such as natural disasters for the region's agriculture in the reporting year, water shortages during the growing season, and the salinity of agricultural lands. However, the analysis of the report shows that there are untapped internal opportunities to increase production and improve quality in the agricultural sector of the region. In particular, the volume of forestry products in the region in 2019 will reach 314.2 billion which is 103.2% more than in 2018, while the volume of production in fisheries amounted to 58.9 bln. soums, which is 101.3% compared to 2018, and these results can be positively assessed. This is due to the fact that Kashkadarya region is experiencing structural changes in agriculture, which can be seen in the distribution of agricultural products by region (Figure 2). The results of the vertical analysis show that there are positive changes in the organization of production in the region.

In particular, 73.5% of production entities in the sector are dehkan (personal assistants) farms, increasing employment, increasing family incomes, while the share of farms is 24.6%. This is evidenced by the fact that land is being replaced, and the share of agro-clusters in agriculture in the region is growing. The fact that the lowest share, 1.9%, is accounted for by agricultural organizations indicates that production in the sector is being liberalized. (as a percentage of total volume)



- • Dehkan (personal helper) farms
- • Farms
- • Organizations engaged in agricultural activities

**Figure 2. A village produced in 2019 in Kashkadarya region distribution of agricultural products by economic categories analysis [7].**

In conclusion, based on the results of the economic analysis, we make the following general proposals and recommendations for agriculture in the region: improvement of reclamation of arable lands, cleaning of open ditches and closed collector-drains to reduce salinity, alternating planting use of planting scheme, creation of high-yielding and climate-friendly varieties and continuous selection work, strict adherence to the terms of cultivation of crops during the current growing season, use of economical, modern methods of irrigation, drastic reduction of unproductive costs in the network, increase labor productivity use of permanent workers' services, establishment of economic analysis centers in all established agro-clusters, as well as regular analysis of accounting and reporting indicators the transfer is considered expedient.

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**The role of investment in agriculture**

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**Annotation:** The article emphasizes the importance of strengthening the investment process in agriculture in the context of economic reforms and production development. It is necessary to improve effective economic mechanisms for agricultural restructuring, based on the fact that investments are an important economic factor in forecasting agricultural structures. Scientific findings and scientific advice are developed based on research and analysis.

**Key words:** agriculture, investment attractiveness, seasonality, structural changes

### **Introduction**

A report from the United Nations Office of Economic and Social Affairs admits that the coronavirus pandemic could lead to a 1% slowdown in the global economy by 2020. In the third quarter of 2020, the global economy will continue to face restrictions on economic activity, which could be even more damaging if the decline in incomes and consumer demand cannot be stopped. Global GDP May Shrink 0.9% in 2020 Due to COVID-19 Coronavirus Pandemic (UN, 2020)

In our country, as in other countries, the quarantine has been announced to prevent the spread of coronavirus infection COVID-19 in the country. At the same time, along with other sectors of the economy, the negative impact of quarantine will have an impact on agriculture. The continuation of these processes is likely to further confuse the current problem of food security in the world and lead in this regard to a food crisis.

Today there are problems in the republic, especially in rural areas, which need to be addressed in terms of employment. Weak efforts to attract foreign investment in agriculture, incomplete employment opportunities in processing, social infrastructure and home-based work, high labor force participation, low economic activity and employment in rural areas, poor organization in rural areas. Most of the jobs provided are short-term and seasonal, a significant proportion of the employed population is employed in low-wage sectors, the informal sector and precarious jobs, and external and internal labor migration is poorly organized.

Food security, creation of the necessary economic and organizational basis for the development of agriculture and water resources in the country will further increase the need to create additional conditions for structural changes. This, in turn, will accelerate work on the modernization of agriculture in Uzbekistan, the introduction of new equipment and advanced technologies, more efficient use of limited land and water resources, capital and labor, as well as the main tasks to increase investment attractiveness. Modern research in this industry is distinguished by its relevance at the present time.

### **Main part**

It should be emphasized that investments are an important factor in supporting, accelerating and developing the country's economic growth and agricultural development. Only on the basis of investments is it possible to renew fixed capital, as well as on the basis of increasing the competitiveness of products by reducing production costs and improving quality.

In this regard, according to the Decree of the President of the Republic of Uzbekistan "On Approval of the Strategy for the Development of Agriculture of the Republic of Uzbekistan for 2020-2030" (2019), the development of the following priorities has been highlighted: ensuring food security of the population, creating a favorable environment for agribusiness and a supply chain, increasing investment attractiveness, achieving an increase in employment of the rural population, increasing human resources, developing economic mechanisms to ensure the development of science in agriculture (Decree, 2019).

Also, the Decree of the President of the Republic of Uzbekistan №-5969 of March 19, 2020 "On priority measures to mitigate the negative impact of the coronavirus pandemic and the global crisis on the economy" (Decree, 2020), also April 3, 2020 No.PF-Resolution No. 5978 "On additional measures to support the population, economic sectors and business during the coronavirus pandemic "(Resolution, 2020) and in order to provide additional support to the budget, enterprises in agriculture, utilities and energy, agreements with international financial institutions totaling \$ 3 billion US dollars were adopted. Preliminary agreements on long-term concessional

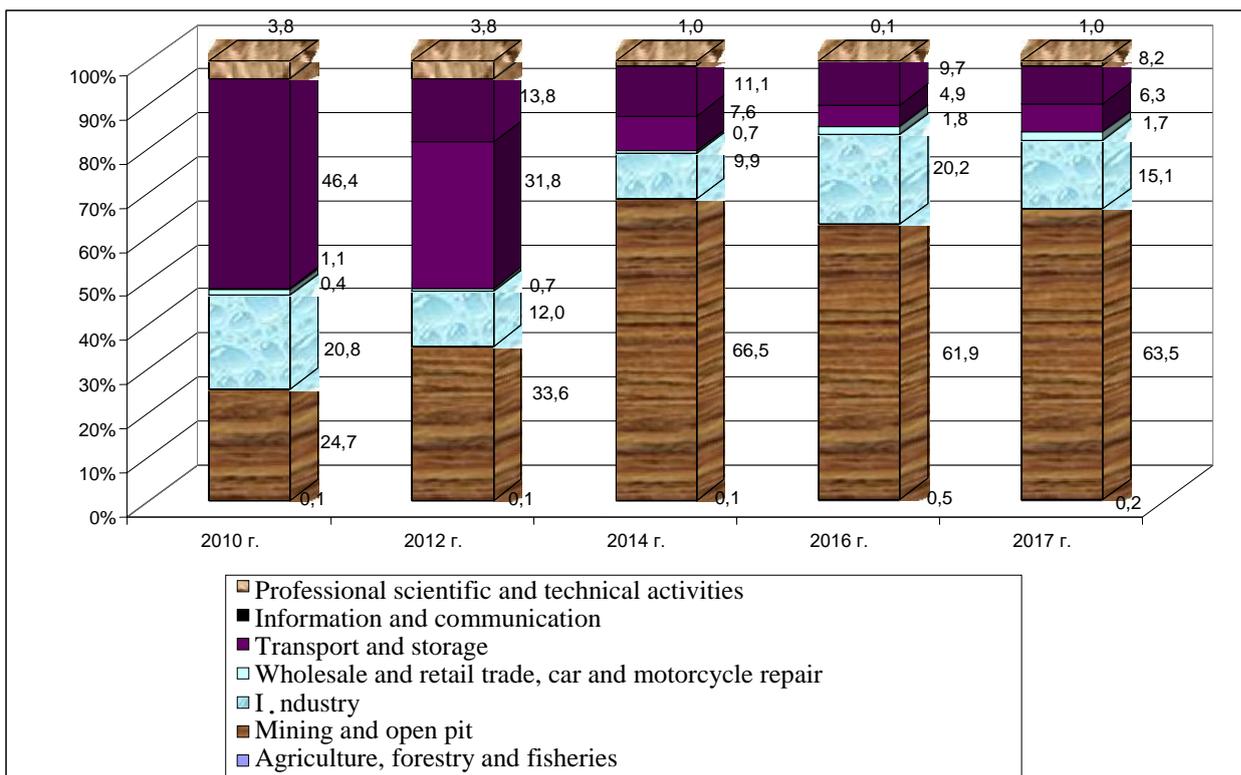
loans and grants, as well as the development and implementation of the "Roadmap" to attract grants and long-term concessional financing for measures to combat the negative consequences of the global coronavirus pandemic and instructions to create a coordination group to attract grants and long-term concessional financing. The above-mentioned decree, the decree is to mitigate the impact of the global economic crisis on the country's economy, as well as in the development of sectors of the economy, support for the population.

Changes in structures in the national economy, in particular, the intensive development of agriculture and the acceleration of innovation and investment activity in the activities of all participants in economic processes, characterize the features of modern socio-economic processes. In economically developed countries (USA, Japan, Switzerland, and Sweden), the share of investments in science and innovation in GDP is 3.0% of GDP, and 2/3 of these funds come from entrepreneurship in innovation, more than 70% of scientific developments are accounted for by non-state sectors of the economy. In addition, the volume of investments attracted in the integrated development of the countryside, increasing the efficiency of intensive factors of agricultural development, the creation of non-agricultural jobs in the world is 8-9% of the total investment.

“Scientific research in the agricultural sector is an important source of future innovative ideas that can be implemented in the industry. At the same time, due to the high need for the development of the industry based on scientific results, the introduction of science should be materially encouraged by the state. It is also important to consider increasing the interest of researchers. First of all, it is necessary to introduce scientific innovations in the industry, taking into account the specifics of the regions (soil-climate, etc.), i.e. in this case, it is important to develop a concept for the development of agriculture in the country and finance them. The interrelation of the agricultural sector creates a solid foundation for the development of agricultural research in accordance with modern requirements (Ushachev, 2006). At the same time, based on the experience of the development of the agrarian sector in world practice, it remains important to study ways to increase the investment attractiveness of various levels of organizational structures and determine ways to ensure competitiveness, a comprehensive assessment of the effectiveness of investments in agriculture, and improving the mechanism for investing in innovative activities. The investment consists of replacing the uncertain present value of capital with uncertain probability and expected future value. This can be proved by the risks in attracting investments, which are deliberately clear and unambiguous (Gozibekov, 2003).

Indeed, one of the main obstacles in the development of economic sectors today is the lack of investment in the real sector of the region's economy. Investment attractiveness of regions is the basis for the development of investment policy. It should be noted that today the investment attractiveness of the country's regions (especially in rural areas) is rather low. Also, the methodology for assessing investment attractiveness is underdeveloped and requires improvement. For this reason, the issue of assessing the investment attractiveness of regions and identifying the sources of its increase is relevant both theoretically and practically.

Based on the existing approaches and methods for determining the investment attractiveness of regions of the country, it should be noted that according to the generalized classification of groups of factors (indicators) that affect the investment attractiveness of a region, this system of investment attractiveness covers all areas, taking into account different wishes (interests). It should be noted that the distribution of investments by industry reflects both the rapid development of priority sectors, which are entrusted with the implementation of comparative economic advantages, and its structural trends, in connection with which it is advisable to analyze changes in investments in fixed assets. The total investment amounted to 16.463 billion in 2010, 44.810 billion in 2015 and 72.155 billion in 2017, and in 2010 - 1,655 billion in agriculture, forestry and fisheries, in 2015 - 4.515 billion, and in 2017 - 6.110 billion soums (Figure 1). This means that the funds allocated to this sector are relatively small compared to investments in other sectors of the economy, as can be seen in the figure below. The data in Figure 1 show that in the years analyzed, investments in mining and quarrying, wholesale and retail trade, and production increased, and in 2017 6.4% of the total funds were allocated to agriculture, forestry and fisheries.



**Figure 1. Investments attracted in fixed capital of the Republic of Uzbekistan in 2010-2017 by economic activity (%)**

Recently, investment processes have livened up in our country. The analysis shows that the basic part of investments is directed to the development of key sectors of the economy, which will accelerate the formation of production and infrastructure. Structural changes aimed at increasing the production of competitive products and the creation of new industries on the ground have contributed to an increase in the demand for investment for industrial development. To support the agricultural sector and increase investment attractiveness, it is necessary to further improve the organizational and economic mechanism, which includes private and state forms. The mechanism of investment activity in the agricultural sector is formed taking into account the specifics of the industry, it is advisable to take into account the specific economic laws of agriculture.

**Firstly**, reproduction in agriculture is closely related to natural processes in nature. It takes into account living organisms (animals, plants, microorganisms) as necessary elements, as well as soil, fertility, which is associated with biological factors. Studies show that when forming the mechanism of investment activity in this area, it is necessary to take into account the influence of laws on development.

**Secondly**, the disconformity between the period of activity in the agricultural sector and the period of continuous production is determined by the fact that production in this sector is seasonal. For this reason, the seasonality of production in the industry has a significant impact on the organization of production, the efficient usage of equipment and technologies, labor resources and investment funds.

**Thirdly**, land is the main factor in agricultural production. Differences in soil fertility and location of the farm in relation to the delivery of the grown product to the point of sale do not create the same conditions for a restitution on investment.

**Fourthly**, an important feature of agriculture is that the created product is directly involved in the production process, i.e. some of the grain, potatoes and other crops are used for sowing. The crop is also used as seedlings, livestock feed, and most of the livestock is used to restore and

enlarge the herd. In this regard, additional investments are required for the construction of barns and production facilities.

**Fifthly**, the cultivation of agricultural products is carried out over large areas and is distributed over different climatic zones. This seriously affects farm productivity. The spread of agricultural production over large areas leads to the transportation of a large amount of various goods - crops, feed, fuels and lubricants, fertilizers and spare parts. This situation calls for excessive demand for agricultural energy resources and additional means of production. Their purchase requires large investments.

**Sixthly**, the use of agricultural machinery also has its own characteristics, that is, it is associated with factors of the regional breadth of land plots and the seasonality of production. The labor required to plant, care and harvest on farms reduces the use of machinery, and this process increases the demand for fixed assets. Since most production processes are seasonal, they are performed once a year and for short periods of time. In this regard, for a long and effective use of agricultural machinery throughout the year, as well as depending on the specialization, it is necessary to take into account the characteristics of the crops grown. With this, it is necessary to take into account their universality. This is reflected in the volume of investments aimed at purchasing the necessary agricultural equipment to replace morally and physically obsolete equipment.

**Seventhly**, the results of agricultural production depend on the productivity of the enterprise, agro-climatic factors and weather conditions. The yield changes over the years depending on the meteorological climatic conditions. This is reflected in the investment policy aimed at developing capacities for the storage and processing of agricultural products. The inflow of capital into reserves is covered by that part of the crop that creates favorable conditions for storing the large-scale harvest of the year. Ignoring these features leads to large crop losses and requires large investments in growing agricultural products in the future.

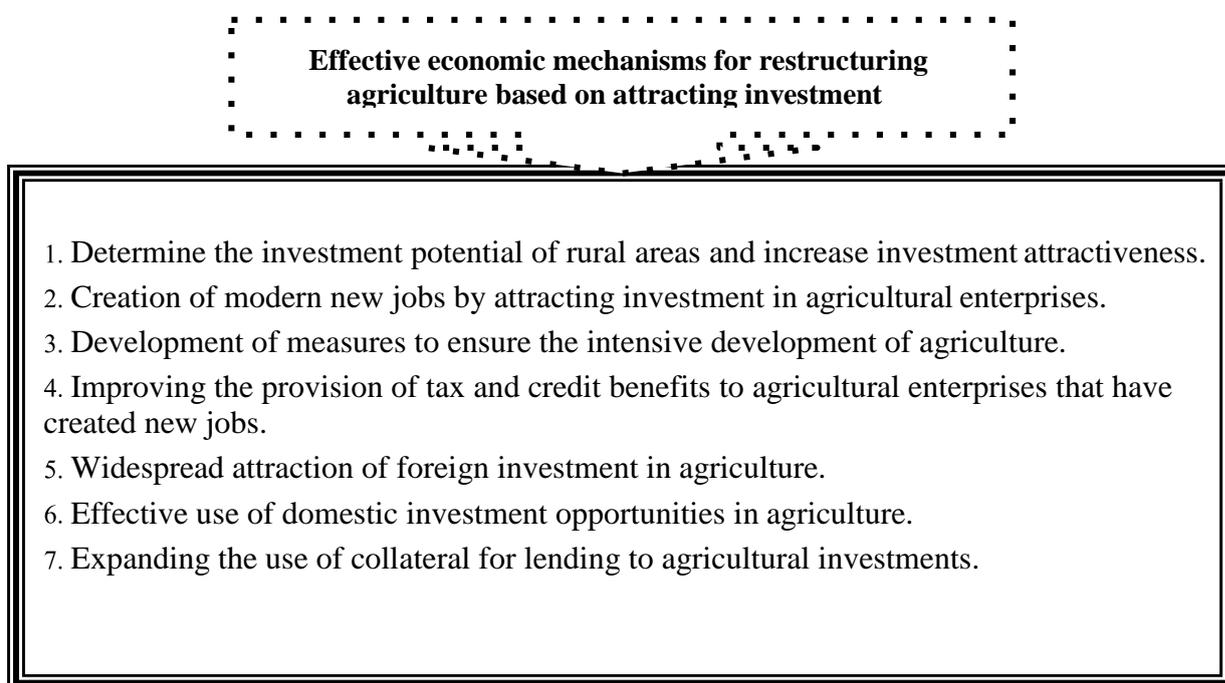
**Eighthly**, the organization of labor processes in crop and livestock farming has its own characteristics. The contractor will not have a permanent job. Therefore, depending on the seasonal nature of plant care, workers perform different work, in which the types of work can change not only every day, but also within one working day, depending on the conditions. In this regard, the demand for intellectual and social investment in rural areas is growing.

In agriculture, an effective economic mechanism for carrying out investment activities, based on the specifics of the industry, is shown in Figure 2 below. General principles of the main directions of the use of investments in the agricultural sector directly affect the final results in this area and specific principles. They create the placement of investments in specific areas and facilities under the influence of specific socio-economic, environmental and technical factors. Therefore, in this situation, it becomes necessary to strengthen the material and technical base of agriculture and improve inter-branch relations through the effective formation of regional and economic processes in the country. By increasing the volume of investments, improving the management of labor, financial and other types of resources, agro-industrial complexes will be able to solve social, economic and investment problems and have a significant impact on attracting foreign investment in agriculture.

Research shows that in areas with high levels of agricultural production, there are disparities in the supply of consumer goods compared to other areas, as well as in the production and sale of agricultural products locally.

The objects of management within the framework of investment are all types of resources: land directly used for agricultural production, especially the interregional division of labor for agricultural production and investment in the agricultural sector. During the period of agricultural production reform, the relationship between investment and factors of economic growth will change. The introduction of new agricultural technologies and equipment will lead to a decrease in material consumption and the capacity of stock funds in the agricultural sector, and, as a consequence, an increase in the return on funds and product quality. From the point of view of the final results of agriculture, these processes will lead to a decrease in unit costs for the final product,

a decrease in labor costs and an increase in indicators that determine the effectiveness of investments in this area. At the same time, in each cycle of the reproduction process, living labor is the main creative force, and the process of materialization of knowledge significantly affects the investment process.



**Figure 2. Effective economic mechanisms for restructuring agriculture based on attracting investment**

The criteria for the effectiveness of investments in the agricultural sector represent the achievement of bilateral results, i.e. a complete description of the factors of the process of investing in agriculture with the standard of living of the rural population in increasing economic efficiency.

Objective scientific approaches are necessary in the implementation of the main stages of the methodology of investment research in agriculture. Because without scientific approaches, even in small investment projects, the existing structure can lead to undesirable consequences in achieving the final results in a restructured agricultural economy. Therefore, scientifically based conclusions and approaches are needed when studying key areas of investment and the effectiveness of projects being implemented. In addition, the basic general principles of investment in agriculture have a direct impact on private principles. They occur on the basis of territorial selection for investment in agriculture under the influence of a specific situation. For example, the creation and placement of new industries in the region should be focused on the needs of the material and technical base of agricultural production (the level of development of productive forces, structural specialization of fixed assets and social infrastructure) and the current state of investment processes.

In addition, the dynamic development of technological progress in agriculture creates new production needs for investment in less advanced equipment and technologies, and the greater the difference between the ratio of personal and production needs, each significant innovation for technical support of agriculture and its departments. It can be seen that the growth rates of the entire agricultural production system are often determined not only by needs, but also by the economic capacity of resources.

Accordingly, the proposed methods of the main stages of the methodology for researching the effectiveness of agriculture are as follows:

- substantiation of the rational relationship between the structural and investment

restructuring of the economy and the socio-economic situation in the village. Investment is an important economic tool in forecasting agricultural structures;

- prospects for the development and improvement of agricultural production structures;
- Identify the factors related to future growth in agricultural gross income.

### **Conclusion**

Investments are the creation of a material and technical base corresponding to each stage of the development of industrial relations, fully consistent with the achievements of scientific and technological progress. Consequently, investment is a factor affecting the level of socio-economic development of society.

The transition to a system of regulated market relations requires an approach to solving problems related to investment efficiency. Therefore, it is necessary to develop new indicators to determine their effectiveness by methods of assessing the effectiveness of investments. However, their use in practice does not seriously affect for the following reasons: insufficient consideration of the peculiarities of agricultural production, lack of consideration of factors of low profitability and objective conditions of production in the country's agriculture.

Effective use of investments in the agricultural sector will increase production volumes and ensure consistency in solving problems related to ensuring the economic sustainability of the industry. In the formation and distribution of investments, various forms and methods are used.

In the first form, two or more regions invest in the process of using private resources on their territory to meet long-term needs. In the second form, the distribution of investments is carried out throughout the country to jointly solve existing problems. In this case, production facilities are created in one area with the participation of other regions interested in using the finished product.

The third form means the implementation of the process of joint investment in accordance with the existing capabilities of enterprises in the respective regions.

Therefore, the forms and methods of investment are constantly being improved. The role of this process is due to the expansion of the scale of agriculture, the complexity of its structural structures, inter-branch, intra-branch and regional ties and their interconnections. The essence of the matter is that the strengthening of the investment process in agriculture will accelerate the solution of problems associated with the development of production in the industry. In this regard, it is advisable to take measures to organize the effective use of agricultural land in various sectors of the economy, in particular in agriculture, to ensure the widespread use of resource-saving technologies and ensure food security.

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**Quantity, price and risk rationing in rural credit markets – An empirical analysis of**  
**Kyrgyz rural credit demand and uptake**

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## Abstract

Low access to rural credit is hampering agricultural and rural development in developing and transition economies. Credit rationing or quantity rationing, defined as insufficient credit volumes at adequate interest rates and collateral requirements, is commonly held responsible. This paper is researching into the contribution of demand-side factors like internal price rationing and risk rationing, in addition to supply-side factors along the case example of Kyrgyzstan. Towards this aim, we explore the determinants of credit application and take-up along the nationally representative Life in Kyrgyzstan (LIK) dataset of 3000 rural households in Kyrgyzstan. The results of hierarchical analysis indicate that farmers are restrained by demand-side factors that reflect farmers' perceived risk of credit default and loss of collateral. Supply-side factors, such as real credit constraints and collateral requests, meanwhile have a stronger influence on credit applications and take-up rates. These findings support recent works that highlight the role of risk rationing for agricultural investment, suggesting a stronger focus of development policy on improving risk-sharing mechanisms for farmers.

**Keywords:** credit rationing; risk adversity in agricultural finance; credit take-up; risk rationing

## 2. Introduction

Rural credits are able to release liquidity constraints and thus positively support rural self-employment (Han & Hare, 2013). Agricultural credits increase capital input in agriculture (e.g. Narayanan, 2016) and factor productivity (e.g. Abdallah, 2016). By inciting growth in and outside agricultural activity, rural credit and agricultural credit in particular can thus improve rural incomes (Burgess & Pande, 2005; Nadolnyak, Shen, & Hartarska, 2017).

In smallholder systems, underinvestment into the agricultural sector is generally understood as a symptom of credit constraints among farm households (Petrick, 2003). Credit constraints particularly deter long-term investment and investments whose returns are subject to uncertainty (Garicano & Steinwender, 2016): Due to information asymmetries and difficulties to enforce payments, interest rates and collateral requirements of formal credits in high-risk conditions like agriculture are particularly high (Hoff & Stiglitz, 1990). Especially smallholders are disadvantaged as banks tend to use farm size as a proxy for unobserved farm characteristics and thus discriminate against small farms (Carter, 1988). Overall, credit market imperfections and dysfunctions are seen as the major impediment against the spread of formal credit and underinvestment among farm households (Hoff & Stiglitz, 1990).

Commonly, excess demand for formal credit in contrast to informal credit solutions, as well as an excess demand for agricultural credit itself is assumed. The universal validity of both assumptions meanwhile is contested by empirical evidence. Research by Binswanger and Sillers (1983) showed that most farmers across the world are risk-averse, with few variations across cultures, income levels or production environment. This property leads to the preference of high interest rates over collateral requirements, channelling potential borrowers towards informal credit agencies, who rather offer credit lines with such properties. Indeed, Pal (2002) found that farmers indeed prefer informal credits, also due to uncomplicated and adequate access. This finding adds support to Lerman and Zedik's (2009) argument that the general conservative and risk-averse nature of farmers may lead to low formal credit demand, also in absence of credit rationing.

This article's aim is therefore to assess whether credit constraints and the low take-up of credit in rural areas of transformation economies are truly due to supply-side factors like quantity constraints/credit rationing or simply the low demand for formal credit, which is a result of the risk-rationed condition of farmers in low- and middle-income countries. Towards this aim, we conduct hierarchical regression analysis of 2016 rural credit data collected in the scope of the survey *Life in Kyrgyzstan* (Brück et al., 2014). Our findings shed new light on the role of demand-side factors and in particular risk rationing among rural households, suggesting further support

towards the development of risk-sharing in smallholder agriculture.

In the following, chapter two will provide a conceptual framework for the study, followed by chapter three, an introduction of credit market structure in an exemplary developing country characterized by low credit take-up in agriculture, Kyrgyzstan. Chapter four introduces the empirical model, followed by the data in section five. Chapter six presents empirical results, which are discussed in the final chapter seven.

### 3. Conceptual framework

The most straightforward explanation for low credit take-up is credit rationing. The concept of credit rationing itself eludes a universal definition, with wide variation of understandings of the concept being given in international research literature. On the most fundamental level, the term describes a setting under which credit demand exceeds the amount of loans that lenders are willing to provide at the current market rate (Turvey & Weersink, 1997). In practice, credit rationing is exerted for instance by imposing caps on the total volume of credit lines. Stiglitz and Weiss (1981) argue that credit-rationing also takes place when banks can't or won't adapt the interest rates to the actual default risk. Instead they chose to restrict credit access via non-price terms, for instance high transaction costs or high collateral requirements. In this case, customers are not denied access per se but are crowded out to informal credit markets or completely refrain from taking a credit (Boucher, Guirkinger, & Trivelli, 2009). Alternatively, credits rationing can also occur when the loan volume adjusted at below the level of the loan requested by the applicant, albeit interested rate remains at the initially agreed level (Jaffee & Russell, 1976).

Other definitions simply define credit rationing under a situation in which banks are not willing to adjust interest rates or collateral to the individual loan risk, even though a lender is ready to accept these conditions.<sup>1</sup>

The definitions above share the common denominator that applicants are fundamentally **quantity rationed** if they do not receive a loan even though they are willing to accept the related interest rates and collateral requirements. Under a slightly different scenario, individuals refrain from an application in the assumption that the application will be unsuccessful. This internal self-selection is, according to Bayda et al. (1994), most common in developing and emerging economies. In cases where the underlying assumption on the availability of credits is accurate, this phenomenon can also be classified as quantity rationing. Otherwise, this ex-ante self-selection is a mere expression of low demand or risk-aversity on the side of the farmer, which prevents him or her from further enquiries into the availability of credits.

Equilibrium markets, in which banks use interest rates and collateral requirements to screen the risk of credit default, meanwhile should not be confused as a case of credit rationing (Bester, 1985). As proposed by Boucher et al. (2008), information asymmetries and the resulting transfer of risk of credit default to the borrower translate into high collateral requirements. Farmers in these markets might see lower benefit of taking a credit and coping with extensive transaction costs and the risk of losing their collateral, as compared to low-value but safe production. These farmers in consequence refrain from filing a credit application or reject a loan offer, thus are **risk-rationed** (Boucher et al., 2008). Applicants, in contrast, that fail to come up to said collateral requirements and negotiate an arrangement with higher credit rates are in contrast quantity rationed. Similarly, credit agencies might decide to deal with the risk resulting from information asymmetries or generally high default risk by raising the credit rates. According to the framework proposed by Verteramo Chui et al. (2014), potential applicants may thus again decide not to apply for credits when confronted with high interest rates, resulting in internal **price rationing**.

Based on these possible outcomes of decision-making processes among farmers and creditors, as defined by previous research, we conclude with a process like depicted in figure

Figure 1 reflects the neuralgic points in the process of applying for a credit. On the one hand, the question of whether or not individuals' credit application is rejected or not is a rather clear-cut question of quantity rationing. On the other hand, whether or not applicants decide for an application in the first place, or whether they decided a take on a proposed credit line could point

to quantity rationing, price rationing and risk rationing alike. Verteramo Chui et al. (2014) identify a survey scheme, which helps to dissect demand from supply-side factors. Meanwhile, many datasets may lack such detailed structure. What is more important, many interview partners may choose to conceal the true nature of their decision-making process.

Therefore, a crucial question remains: How to identify supply- and demand side factors influencing credit take-up when lacking trustworthy details on the individual decision-making process? A potential solution might be to not focus on the latent decision-making process but instead to focus on individual, household or farm characteristics, which are easier to measure and are typically contained in unspecialized household data sets.

Empirical evidence on credit demand is ample. As also depicted in figure 1, required collateral is given as main factor influencing credit take up. Availability of collateral could be proxied either via household income (e.g. Sekyi, 2017), off-farm income, both positive (Muhongayire, Hitayezu, Mbatia, & Mukoya-Wangia, 2013) and negative (Jia, Heidhues, & Zeller, 2010), household capital endowment (Duy, D'Haese, Lemba, & D'Haese, 2012), or ownership of livestock and consumption goods (Angioloni, Kudabaev, Ames, & Wetzstein, 2018). While the role of land holding depends on national land regulations and land titling systems, they are, when acting as collateral, a decisive factor for credit access (Swain, 2002). Another factor pointing towards the importance of collateral is the positive relationship between crop insurance and credit access and demand, as for instance empirically found by Mishra (1994). However, it should be noted that collateral reflects both the need for credit, but also the opportunity to attain a formal credit, thus might contribute to both supply-related and demand-related non-application.

The importance of the presence of geographic proximity to informal financial systems was highlighted for instance by Muhongayire et al. (2013). Social status meanwhile can be linked to credit applications via collateral, but also point to elite capture (Jia et al., 2010). Recent researched confirmed the significant positive influence of access to local social networks for microcredit access (Asante-Addo, Mockshell, Zeller, Siddig, & Egyir, 2017; Wydick, Hayes, & Kempf, 2011).

As argued before, credit take-up may also be influenced by intrinsically low demand for credit. Trust issues, risk attitude, high risk of credit default or other individual factors can decrease demand for credit in the first place. Most prominently, farmers' risk preference might inhibit the demand for formal credit. Binswanger and Sillers (1983) argue that farmers and rural population is on average more risk averse than the main population. Asante-Addo et al. (2017) find that fear of loan default and thus loss of collateral is the most important reason deterring farm households from joining credit programs. Instead, farmers seeking credit are likely to turn to the informal sectors offering low-collateral loans at high interest rates: As pointed out by Binswanger and Silas (1983), risk averse individuals prefer high interests over collateral-requirements to avoid high additional costs at the default case. Beyond risk attitude, also actual or perceived risk can influence the demand for credit. For agricultural producers, credit is a risk management instrument, thus credit demand is found to be positively correlated with perceived risk of production shocks (Saqib, Ahmad, Panezai, & Ali, 2016).

Finally, there are certain individual factors that can contribute to self-selection both from the supply-side and the demand-side. Education for instance was found to influence not only credit rationing (Barslund & Tarp, 2008; Jia et al., 2010) but also credit demand (Mpuga, 2010) and thus credit market participation in whole (Muhongayire et al., 2013). Gender may play a role for both credit access and demand. In particular, lower access of women to formal collateral like land titles may worsen credit access (Fletschner, 2009; The World Bank, FAO, & IFAD). Also, difference in credit demand could be found (Mpuga, 2010). Gender difference meanwhile may vary with cultural and political backgrounds. For instance Baydas et al. (1994) find so no significant differences in credit demand and credit rationing between genders in Ecuador.

Previous literature overview showed that low credit take-up can be a consequence of a) low credit supply in terms of overall amount at given market rates or the lack of flexibility in adapting rates and collateral requirements to individual credit applications and/or b) lack of demand for credit at interest rates and collateral requirements caused by risk rationing and/or

internal price-rationing at the side of the farmer. At given credit rates and collateral requirements, demand for credit is the result of a complex cost-risk assessment, taking into account existing risk coping strategies, potential investment gains, but also individual factors like prudence, risk preferences and risk perception. The strength of each of these factors in determining both credit application and credit take-up has so far not been weighted against each other and will be empirically tested in this study.

#### **4. Agricultural credit in Kyrgyzstan**

As case study, we select rural Kyrgyzstan, where agriculture is employing as significant share (26%) of the country's population (The World Bank, 2019) and climate conditions are fairly favourable. The vast majority of farms are led by households, the typical farm size being two hectares (Mogilevskii et al., 2017). Under these conditions, agriculture yet fails to provide meaningful income sources. During the past 15 years, the value added of agriculture hardly increased, unlike in other former countries in Eastern Europe and Central Asia. Especially in comparison to benchmark neighbours Tajikistan, Kazakhstan, Uzbekistan and even Turkmenistan, agricultural development is low. For example, between 2001 and 2016, the value added in agriculture, forestry and increased by 52% in Kazakhstan, by 154% Uzbekistan, 201% and 55% in Ukraine. In Kyrgyzstan, by contrast, we observe an increase of the same indicator by only 33% for the same period (FAO, 2019). The failure of agriculture to provide meaningful income to the rural population has led to massive seasonal or permanent migration of rural population into labour markets of urban centres inside or outside the country.

Due to the distinct smallholder character of Kyrgyz agriculture, household and farm budgets are usually entangled, household investment and farm investment decisions being made simultaneously. Overall, Kyrgyzstan features a relative credit take-up, which is among the lowest in the CIS countries (see Table 1). In 2016, the banking sector allocated USD 26 agricultural credits per hectare of agricultural land, compared to USD 58 in Azerbaijan or even USD 169 in Armenia (FAO, 2016). As of now, rural or agricultural credit therefore is unlikely to provide the necessary means to modernize smallholder agriculture.

The first important feature that might lead to low credit take-up is quantity rationing. The Kyrgyz credit market is dominated by the state-owned banks and several private banks. In terms of rural credit supply, we observe state supported credit lines with more affordable rates and credits by private banks with very high rates. For smallholders, a limited number of loans at state-subsidized rate was first introduced in 2013 under the name *Affordable Loans for Farmers* (International Monetary Fund, 2016). The most favourable rate of 10 % is given for crop and livestock production activities as well as developing rural cooperative. Credits at higher rates of about 20 % (still lower than market rate) are distributed for rural entrepreneurship activities such as processing and marketing. The state compensates its partner banks the difference between the subsidized loan interest rate of 10% and the average market interest rate. The total amount of loans was determined at 7 billion Som in 2018 (about USD 1 million) (The Government of the Kyrgyz Republic, 2017). Concessional credit lines for the agriculture sector were extended to the Aiyl Bank, the Financial Company for Support and Development of Credit Unions, RSK Bank, Bakai Bank, Bank Kyrgyzstan, and Kyrgyz Investment and Credit Bank. Subsidized credit lines targeting agriculture sector have also been made available by the State Economic Development Fund under the Ministry of Finance and by the National Bank of the Kyrgyz Republic (IBP, 2016). The volume of support, however, is again limited (FAO 2018).

About eight private banks offer rural credits (Japan International Cooperation Agency 2014). Many of these credit lines feature high interest rates due to the signification transaction costs when collecting information on financial histories of small farmers (Angioloni et al., 2018).

Due to the quantitative restrictions of credits with subsidized interest rates, non- bank financial institutions are another popular credit source in Kyrgyzstan (FAO and EBRD 2011). The microfinance system is in place since 1994; by 2013 there were 249 microfinance institutions across the country (Japan International Cooperation Agency, 2014). These forms of credits taken

are usually provided based on market rates without subsidies, often without a difference in terms between rural or urban household. Therefore, the interest rates are high, on average 39%, in some cases up to 59%. The size of loans provided is usually very small, only up to 110 USD (FAO and EBRD 2011). The microfinancing sector has an advanced legal framework and suitable outreach capacities to service poor rural households. Additionally, regulations concerning borrowing history and collateral are less strict than in the formal banking sector (Anglioloni *et al.* 2015). In formal banks, collateral is necessary if the debtor makes a down payment only less than 30 % of the total value (Japan International Cooperation Agency, 2014). However, according to Kyrgyz legislation, commercial banks cannot own agricultural land, thus farm land is not accepted as collateral (Akramov & Omuraliev, 2009). Mortgaging of houses is not an option for remote areas and for real estate that does not meet certain quality standards (FAO and EBRD 2006). In general, houses in rural areas are of very low value, which in most cases is not enough for mortgage (Japan International Cooperation Agency, 2014).

Consequently, microfinance plays an important role in improving credit access in rural Kyrgyzstan (Akramov & Omuraliev, 2009) and in particular to farmers: 49-67% of the total credit volume is invested into the agricultural sector (Japan International Cooperation Agency, 2014). Additional credit agencies are credit unions that are being promoted by the government and donors in the rural areas of the Kyrgyz Republic. There are currently about 270 credit unions in the country (Akramov & Omuraliev, 2009), however again with rather high interest rates of 18-35 % p.a. (FAO and EBRD 2006). Nevertheless, there has been a substantial increase in the amount of credit provided by banks that is directed to the agricultural sector (Figure 2). Especially since the year 2007, we observe a substantial rise of agricultural credits, both in absolute terms and as compared with total credit volume.

Also the sources of agricultural credit have been shifting, as is illustrated in figure 2. While in 2008 commercial banks provided 2312 million Som to farmers, this increased to 24663 million Som in 2016, or by 967 %. At the same time, there was an increase in credits provided by non-bank financial institutions. In particular, the total value of loans from microfinance institutions grew, from 94 million Som in 2004 to 2884 million Som in 2017, an increase of 2968%. The decrease of absolute loans by microfinance institutions since 2015 is explained by the conversion of several microfinance institutions into banks.

As illustrated in figure 4, interest rates in the 1990s were fluctuating considerably around an average of 50%. Following a constant decrease during the 2000s, interest rates stabilized around 20%, however still fluctuating between 15% and 31% during the last 15 years. Interest rates for credits by microcredit agencies and credit unions were more stable, at about 34% and 28%, and less fluctuations (ranging between 31- 42% and 25-29%, respectively). In the period 2008-20018, the interest rates of both credit unions and microfinance meanwhile were usually considerably higher than commercial bank credits, which featured average rates of 24% during that period.

According to a survey among Kyrgyz farmers, interest rates in many instances did not seem to fit to the demands of farmers (Japan International Cooperation Agency, 2014). Among 200 surveyed farmers, one third expressed their wish of interest rates of maximum 8-10% (FAO and EBRD 2006), which is clearly below the level of unsubsidized credits. A further issue is the maturity period of bank loans, which is on average 28.9 months and 17 months for microfinance loans. Often, this maturity period does not provide sufficient support for agricultural investment (International Monetary Fund, 2016). Another closely related factor is credit history, empirically confirmed for instance by Barslund and Tarp (2008). Additionally, farmers may lack information and instructions concerning the loan application process and the related paperwork (The World Bank, 1999). Furthermore, the same study showed that many Kyrgyz farmers were very much aware of the risk of a credit default following production loss and thus refrained from applying for a credit in the first place (The World Bank, 1999). Another study confirmed that some farmers give up having a consultation with a bank due to anxiety about the failure of repayment, although they were interested in taking a credit (Japan International Cooperation Agency, 2014). Furthermore, numerous banking crises during transition additionally created a general lack of

confidence into the banking system of Kyrgyzstan (Akramov & Omuraliev, 2009). For instance a World Bank study revealed that farmers did not even try to apply for one of the subsidized loans, many of them in the firm believe that access without a “shapka”, a bribe, was impossible (The World Bank, 1999).<sup>2</sup> The same study lists reports on fraud in Naryn region, where scammers charged villagers for support in obtaining a loan without delivering true access to credit (The World Bank, 1999).

All in all, the Kyrgyz farmers might not face general quantity rationing, but rather a mix of price, risk and quantity rationing as the number of credits at affordable rates is limited. In practice, most farmers won't have access to subsidized credits due the limited number of this credit line, which translates into quantity rationing for this particular credit market. Those farmers that accept high interest rates and satisfy collateral requirements of credits at market conditions are unconstrained. However, for some farmers the high rates and transaction costs of commercial credits may be unacceptable. Here, internal price rationing takes place as farmers decide not to borrow at these given market prices and other transaction costs. Some applications for commercial credits are certain to be rejected for missing collateral, resulting in quantity rationing, i.e. supply-side constraints.

The empirical differentiation between supply-side and demand-side rationing meanwhile requires more detailed analysis. The empirical model is presented in the following section.

## 5. Materials and Methods

To estimate the relative effect size of demand side and supply side factors, we conduct a hierarchical regression analysis. This type of regression analysis allows testing whether a specific set of independent variables explains a statistically significant amount of variance in a dependent variable after accounting for all other variables (Cohen, Cohen, West, & Aiken, 2002). Firstly, we add first the block of individual variables, then the two blocks of demand-side and supply-side independent variables. Following the natural process of decision-making, we add demand-side variables at the second stage and then supply-side variables at the third stage. Since the sequence, in which the blocks of variables are added, matters for the interpretation of the analysis, we conduct a second regression for reasons of robustness testing. In this second regression, supply-side variables enter the model at the second stage, while demand-side variables are added last.

Following Binswanger and Sillers (1983), we discern explanatory variables into between supply-side restrictions (like lack of collateral or high debt/equity ratios), and demand-side restrictions like the perceived utility or risk of a credit.

In terms of dependent variables, the dataset at hand provides us with three variables representing credit demand and credit take-up. First, we use a binary variable on whether a rural household had ever applied for a formal credit (see also table 2).

Second, the dataset includes a variable on whether a household took a credit in the past twelve months. Finally, the dataset includes the sum of outstanding loans in the households. The choice of dependent variables is based on the literature review and the conceptual framework established in chapter 2.

Thus we conduct three series of hierarchical OLS and logit multivariate regression analyses, given as:

$$A_{ht} = \beta_1 I_{vt} + \beta_2 D_{vt} + \beta_3 S_{vt} + \varepsilon_{ivt} \quad (1)$$

$$C_{ht} = \beta_1 I_{vt} + \beta_2 D_{vt} + \beta_3 S_{vt} + \varepsilon_{ivt} \quad (2)$$

$$L_{ht} = \beta_1 I_{vt} + \beta_2 D_{vt} + \beta_3 S_{vt} + \varepsilon_{ivt} \quad (3)$$

The three models differ mostly in terms of the dependent variable.  $AA_{ht}$  is a binary variable capturing whether or not a household  $h$  ever applied for a formal credit at year  $t$ .  $CC_{ht}$  is a binary variable on whether or not a household  $h$  took a formal credit during the past twelve month in year  $t$ ,  $ll_{ht}$  is the original sum of the loan taken by household  $h$  in year  $t$ . For each of these regressions, we introduce three sets of explanatory variables. First, we introduce a vector of control variables describing gender, age and education of the household member that makes the decision on

household finances and credits in particular.

Second, a set of demand-side variables  $DD_{h,t-1}$  of household  $h$  in year  $t-1$  enter the regression. This vector includes the self-assessed risk adversity of the decision maker on a ten-point scale, a households' economic outlook on a five-point Likert scale, the number of community group memberships to give the density of a households network. The incidence of a drought shock in the community during the past year captures the objective risk of production loss. Further, the vector includes in for reception of remittances from a household member as a proxy of access to informal credit.

Third, the regression includes a vector of assets  $SS_{vtt}$  of supply-side factors. First, this vector includes three variables proxying the collateral of a household. One collateral proxy is an aggregated asset index generated by principal components analysis and rescaled to a range between 0 and 1, 0 indicating the lowest stock of assets and 1 the highest. The second collateral proxy is the housing quality on a seven-point scale, composed of equally-weighted scores on quality of the floor, the walls, the roof, and the cooking fuel. The third collateral proxy is land holdings in hectare. Two further supply side variables is binary variable on the existence of a credit agency branch in the community to represent the physical access to a financial institution, and membership in a local borrow group. For the third model, additional a categorical variable on bank type was included, as caps on loan sizes differ across bank types.

The basis for this empirical discussion of credit demand among Kyrgyz farm households is the 'Life in Kyrgyzstan' (LIK) study. LIK is an open access, longitudinal survey of 8000 individuals in 3000 households. Due to a stratified two-stage random sampling in all seven Kyrgyz oblasts as well as the cities of Bishkek and Osh, the data are representative at national and at the regional level (East, West, North, South).

The survey was first conducted in 2010, credit items are included since 2012. For this paper, we make use of the time-series character of the survey: While we are interested in the credit decisions in 2016, we employ many time-lagged indicators from earlier waves of the survey to avoid endogeneity issues and allow for causal inference.

The survey covers various topics, among them household demographics, assets, expenditure, migration, employment, agricultural markets, risks and shocks, social networks, subjective well-being. The 2016 wave also covers credit behaviour and some more detailed agricultural data. The 2013 and 2012 waves provide the data for most time-lagged dependent and control variables.

In our dataset, there are 1738 rural households for which we have valid observations from both 2016 and time-lagged variable from earlier waves. Table 1 illustrates the credit demand in 2016. 265 of the sample households stated to have applied for a loan at a microfinance agency, bank or credit union during or before 2016, among which 83.7% succeeded with each of their application. 230 households (13%) took a commercial credit during the past 12 months. With share of 45%, the most frequent lenders were microcredit agencies, followed by commercial banks (25%), private lenders (14%) and credit unions (11%).

Among the most frequent purposes for taking a credit was the purchase of agricultural machinery (20%), covering current household consumption (16%), and funding business launches (12%). A large share of "other purposes" indicates the heterogeneity of reasons to take credit.

According to the schematic by Verteramo Chui et al. (2014), the sample can be disaggregated into following groups: 1451 households stated to never have applied for a loan. These households might be either price rationed (i.e. deterred from applying from a loan due to high interest rate), risk rationed (deterred from applying for a loan due to high collateral requirements and/or the fear of losing this collateral), or quantity rationed (i.e. deterred from applying for a loan, knowing they would denied the loan anyway). Among these three groups, the composition of which is unknown to us, only the quantity rationed group would be restricted from the supply side. Among the 265 households that reported to ever have taken a loan, 29 household reported a rejected application. At least 29 households were thus truly quantity constrained, thus suffering from credit rationing as defined by Turvey and Weersink (1997).

Summary statistics on model variables are given in table 3. As mentioned above, 15% of the households filed a loan application, 13% took up a credit. The mean loan volume taken by sample households was 86,082 Soms (USD 1235). We learn that about 26% of decision makers were female and the rest male. The definition of “decision-maker” was based on self-stated decision-making processes inside the household. The average age of the decision maker was 54 years, 13% had a university degree. The average score for stock of assets is 0.2 with a left-skewed distribution, indicating that only few households were rich and the majority with a low stock of assets. Overall 28% of the respondents can be labelled as risk averse, defined by a score of 0-4 on a 11-level scale. On a PCA-based shock scale ranging from 0 to 1, the average household scored 0.6 in 2016 and 0.12 in 2013. The scale is based on a PCA shock index drawing on a list of 28 different agricultural, health or various other shocks with financial consequence. 12 percent of households received remittances from relatives working abroad or outside their hometown. The mean size of owned land was 0.84 hectare, 0.96 hectare when not taking into account households with zero own land holdings. These low average land holdings are a consequence of agricultural restructuring during the past decades (Mogilevskii et al., 2017).

## 6. Results

Table 4 shows the results from our three estimation models introduced above, the marginal effect for the probit regressions are presented in table 5. For continuous or categorical variables, marginal effects are reported for changes from the mean of sample observations.

The first model estimates the impact of a set of variables on the application decision of sample farmers. Among our variables of interest, we found demand-side variables to be mostly relevant for credit application and uptake: Both risk adversity and external shock events in the same year had apparently deterred credit application, both regression coefficients being negative and statistically significant. While risk averse households were by 9 percentage points (p.p.) less likely to apply for a credit, a unit change of the shock score decreased the odds of applying for a credit by 63%. These findings suggest that past risk experience or being uncomfortable with risk deterred farm households from taking another risk in the form of potential credit defaults.

While risk adversity was not statistically significant for credit uptake, recent shocks did significantly decrease credit uptake as well: A decimal change in the 2016 shock score decreased the odds of credit uptake by 38 p.p.. Apparently, recent shocks put farm households into a worse position to receive or take up a credit, either due to self-selection to perceived high risk of a further shock in the format of a credit default, or due to low credit-worthiness in the eyes of the bank.

On the other hand, shocks in the previous wave of 2013 and remittances by family members were found to be positively correlated with credit applications as well as credit uptake. A decimal change in 2013 shocks increased the odds of applying for a credit by 29 p.p., while it increased the probability of taking up a credit by 20p.p. We can assume that the higher uptake was a consequence of either risk coping measures or ex-ante risk management measures to be safeguarded of future risks.

Family remittances increased the probability of credit application by 8 p.p and credit take-up by 6%. The positive effect of remittances may be explained by the possible function of remittances in increasing the ability of households to serve the monthly

repayments, thus decreasing the risk of credit default and loss of collateral for the household.

While supply-side factors were not correlated to credit applications, we found a significant positive correlation between credit uptake, and land ownership as well as membership of borrow groups. Land ownership increased the likeliness of credit take-up by 1.2 p.p. per ha, while a membership increased the probability of take-up by 18%.

Supply side variables seemed to be much stronger at play in terms of credit volume. Since model 3 features a linear regression, regression coefficients in table 4 can be used as basis of interpretation: Here, we found that both house and land ownership in 2013 were statistically significantly correlated with credit volume in 2016, very likely due to their function as collateral.

With house ownership, the credit volume increased by 69%, with each hectare of land ownership by 6.5%. At the same time, also the membership in a borrow group significantly increased the credit volume, by 45%. Finally, in cases in which the credit was given by a commercial bank, credit volume was higher by 78%, clearly since most other lenders typically award only small credits.

Table 6-8 illustrate the explanatory power added by the three blocks of variables for models 1-3. For model 1, the higher increase in explanatory power for credit applications was introduced by the block of demand-side variables, reflected by a change in  $R^2$  of 0.034. The addition of supply-side variables meanwhile only contributed a  $R^2$  change of 0.012. This observation is robust to a reversal of the sequence according to which the two blocks entered the regression: Even if demand-side variables enter the regression last, they still generate a higher  $R^2$  change (0.031) than the supply-side variables (0.015). The contribution of individual control factors was low, even though this block entered the regression first. These results indicate that in fact, true self-selection driven by intrinsic demand for credit or investment may indeed play an equally important role than self-selection motivated by credit- rationing.

For the second model (table 6), the take-up of credit was explained both by demand side variables (R2 delta: 0.015) and supply side variables (R2 delta: 0.019) to a nearly equal degree. When the sequence was changed, supply side variables' contribution power was higher (R2 delta: 0.022) than demand side variables' (R2 delta: 0.011). Again, individual factors were negligible.

In model 3 (table 8), the balance of explanatory power changed. As illustrated by the R2 change, supply side variables (R2 delta: 0.188) contributed stronger to explaining the size of loans than individual or demand-side variables (R2 delta: 0.021). When supply-side variables entered the regression first, this balance shifted even more to the side of supply-side variables, which now contributed a 0.196 point  $R^2$  change, while demand-side and individual factors contributed hardly or not at all.

## 7. Discussion

The estimations conducted above aimed at unveiling the reason for yet low credit take-up among rural households in low-income countries, differentiating between demand-side and supply-side factors. The results of hierarchical regression confirms that application was to a large degree driven by demand-side factors, in particular individual risk perception, financial shocks or financial shortage, as well as local spill- over effects. Here, apparently the risk of credit default and loss of collateral made potential applicants refrain from applying for a formal loan, i.e. risk-rationing. In terms of credit-take up, demand-side variables were still having a considerable impact, even though supply-side variables had stronger influence than just for credit applications.

Supply-side factors, both in terms of real credit constraints and screening of collateral, had the strongest impact on the size of loans and only to a very minor degree by demand-side or individual factors.

Our results therefore indicate a two-sided credit situation in our sample. Apparently, the emergence of a large market for micro-credits and growth of credit lines in commercial banks led to an adequate supply of small credits, supply-side variables like the existence of collateral did not seem to fundamentally keep people from applying for and making use of credit opportunity. As our data on the usage of these credits shows, many of the funds were rather used for consumption purposes or to compensate for short financial bottlenecks than to conduct real agricultural investment. Demand for these types of credits seems to depend on individual willingness to take the risk of credit default and the actual financial need. Large-scale credits meanwhile clearly depend on the availability of collateral and other supply- side factors. Households without means for managing production risk, for instance via harvest insurance or existing stock of capital, were refraining from taking larger production credits. Once households had chosen to take a credit, the amount of credits and thus the potential to conduct effective investments apparently only depended on the collateral, the type of bank that was approached, and whether or not one organized him or herself in a borrow group.

In summary, we challenge the existence of general credit rationing in Kyrgyzstan. Our data shows an increasing market for smaller credits, which is regulated mostly via demand. Meanwhile, the fact that the productiveness of the investment or the availability of collateral played a minor role for application and general take-up, confirms concerns over growing take-up of unproductive credits in so far. While farmers seemed to be aware of the risk of default, reflected by their risk attitude, the economic outlook was not influencing the decision to take up a loan significantly. At least, applications seemed to undergo a filter at the level of local credit agencies, thus deterring risky loans before an official application was filed.

However, our data does confirm that credit markets of larger loans, which are ultimately required to achieve higher agricultural productivity, are apparently underdeveloped. First, very few rural households took up a larger investment credits. Second, the low influence of individual factors and demand-side factors points towards supply-side restrictions, which may continue to hamper agricultural development and thus the possibility for rural households to make meaningful profits from their production. The relative dominance of demand-side factors point towards high incidence of price and risk rationing, which is in line with the direct interview-based results by Boucher et al. (2008) and Verteramo Chui et al. (2014), who detect relatively large shares of price rationing and risk rationing as compared to quantity rationing.

This research is certainly limited by the comparatively small sample. Future research into the matter is advised and planned in the scope of new waves of the LIK survey. Nevertheless, our research data supports an increase of larger credit lines for agricultural investment loans to modernize production. Strong spillover-effect show that selected households and farms could serve as examples for their peers. Caution meanwhile is advised against the increasing spread of micro-loans for commercial purposes, as they were not strongly connected to potential value added or ability to pay back. The paper provides novel evidence on demand-side factors inhibiting credit take-up and investment in rural areas. Future research should put a more in-depth focus on the role of income volatility, which may influence of both supply and demand rationing but was beyond the scope of this study.

This study provides a new angle and credit constraints in low-income countries. A particular view might be community effects in strengthening the demand for credit via providing a way to share risk, for instance among borrower groups. When confronted with systemic risks like climate risks or economic fluctuations, these provisional risk-management constructs however may not be sufficient to mitigate the effects. Households with recent experience of such financial shocks will remain to have a low demand for agricultural credits, until more effective tools for risk management are created.

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### **Data availability statement**

The data that support the findings of this study are available for download upon application in the International Data Service Center of the Institute for Study of Labour at <https://datasets.iza.org>, doi:10.15185/izadp.7055.1.

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## Tables

Table 1: Agricultural loans in CIS countries, 2016

Country	Agricultural land (in 1000ha)	Credit to Agriculture	
		in million US\$	per ha of agricultural land
Armenia	1677	284	169
Azerbaijan	4773	277	58
Belarus	8533	1444	169
Estonia	1003	464	462
Georgia	2394	10	4
Kazakhstan	216992	1993	9
Kyrgyzstan	10541	277	26
Republic of Moldova	2441	128	52
Russian Federation	217722	12266	56
Tajikistan	4738	132	28
Ukraine*	41508	3133	75

Data Source: FAOStat 2019

Note: \* data for 2015

Table 2: Credit demand and take-up among sample population, 2016

Credit take-up	absolute	relative*
<u>Ever applied for bank loan or microcredit</u>		
No	1451	84.61%
Yes	265	15.39%
<i>Of which: Did your application ever get rejected?</i>		
No	230	88.80%
Yes	29	11.20%
<u>Loan taken in last 12 months (0/1)</u>		
No	1509	86.82%
Yes	229	13.18%
<i>Of which: Source of credit</i>		
microcredit agency	103	44.98%
commercial bank	57	24.89%
private person	33	14.41%
credit union	25	10.92%
commercial organization	9	3.93%
other	1	0.04%
not answered	1	0.04%
<i>Of which: Purpose of credit (multiple entries)</i>		
to purchase agricultural machinery and seeds	59	20.00%
to cover the household's current living	48	16.27%
to start business	35	11.86%
to build a house	29	9.83%
to cover expenses on customs (weddings etc.)	27	9.15%
to pay tuition fees for education	23	7.80%
to pay for healthcare services	10	3.39%
to purchase a house/flat/land plot	5	1.69%
other purpose	59	20.00%

Table 3: Summary statistics model variables

Variable	Obs	Unique	Mean	Min	Max	Label
y01	1715	2	0.154	0	1	ever applied for bank loan or microcredit (0/1)
y03	1738	2	0.132	0	1	commercial loan taken in last 12 months (0/1)
y05	229	36	76320.840	2000	880000	amount of loan taken(in Som)
c01	1738	2	0.264	0	1	female decision maker (0/1)
c02	1738	71	53.840	19	89	age decision maker (in years)
c03_uni	1738	2	0.128	0	1	university degree decision maker (0/1)
x01	1738	2	0.279	0	1	risk aversity (0/1)
x24_2016	1738	456	0.062	0	1	shock score in 2016 (0-1)
x24_2013	1738	506	0.118	0	1	shock score in 2013 (0-1)
x12	1738	2	0.121	0	1	remittances (0/1)
x16	1738	2	0.868	0	1	house ownership (t-1)
x13	1738	393	0.843	0	28.95	land in ha (t-1)
x05	1738	2	0.482	0	1	local credit agency (0/1)
x06	1738	2	0.017	0	1	member borrow group (0/1)
x21	1738	2	0.033	0	1	commercial bank (0/1)

Table 4: Regression results (Probit/OLS regression)

	(1) applicati on	(2) uptake	(3) volume
main			
CONTROL			
female	-0.231 (-1.91)	-0.0199 (-0.25)	-0.0211 (-0.15)
age2	0.000074 (2.13)	0.000013 (0.45)	- (-0.96)
	2*	5	0.000048
			1
university degree	0.164 (1.02)	0.183 (1.43)	0.324 (1.68)
DEMAND			
risk aversity	-0.411* (-2.55)	-0.0943 (-0.71)	0.00568 (0.03)
shock score in 2016	-2.823** (-2.92)	-1.866** (-2.60)	-0.677 (-0.60)
shock score in 2013	1.325* (2.15)	0.984* (2.40)	-0.149 (-0.40)
remittances	0.342* (2.05)	0.281* (2.30)	0.206 (1.31)
SUPPLY			
house ownership	-0.124 (-0.41)	0.108 (0.57)	0.690** (3.18)
land	0.0145 (0.49)	0.0561** (3.17)	0.0647*** (5.34)
local credit agency	0.144 (0.61)	0.146 (1.07)	-0.226 (-1.37)
member borrow group	0.582 (1.54)	0.875* (2.52)	0.454* (2.54)
commercial bank			0.797*** (5.72)
Constant	-1.179*** (-3.40)	-1.456*** (-6.59)	10.06*** (34.92)
Observations	1715	1738	229

t statistics in parentheses

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

Table 5: Marginal effects probit regression (Model 1 and 2)

	(1) margin1		(2) margin2	
<b>CONTROL</b>				
female decision maker (0/1)	-0.0513	(-1.83)	-0.00407	(-0.25)
age2 decision maker	0.0000164	(2.03)	0.00000276	(0.45)
university degree decision maker (0/1)	0.0363	(1.02)	0.0374	(1.43)
<b>DEMAND</b>				
risk aversity (0/1)	-0.0911	(-2.54)	-0.0193	(-0.71)
shock score in 2016 (0-1)	-0.626	(-2.56)	-0.382	(-2.49)
shock score in 2013 (0-1)	0.294	(2.07)	0.201	(2.41)
remittances (0/1)	0.0758	(1.89)	0.0575	(2.22)
<b>SUPPLY</b>				
house ownership (t-1)	-0.0275	(-0.41)	0.0221	(0.57)
land in ha (t-1)	0.00321	(0.50)	0.0115	(3.17)
local credit agency (0/1)	0.0319	(0.61)	0.0298	(1.06)
member borrow group (0/1)	0.129	(1.46)	0.179	(2.49)
Observations	1715		1738	

*t* statistics in parentheses

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

Table 6: Hierarchical regression model 1

Variable group	R2	F(df)	P	R2 change	F(df) change	P
<b>Default sequence</b>						
Controls	0.007	1.534(3,114)	0.21			
Demand	0.041	3.368(6,114)	0.004	0.034	1.348(3,114)	0.263
Supply	0.053	2.349(11,114)	0.012	0.012	0.289(5,114)	0.918
<b>Reverse sequence</b>						
Controls	0.007	1.534(3,114)	0.210			
Supply	0.022	1.767(8,114)	0.091	0.015	0.356(5,114)	0.878
Demand	0.053	2.349(11,114)	0.012	0.031	1.235(3,114)	0.300

Table 7: Hierarchical regression model 2

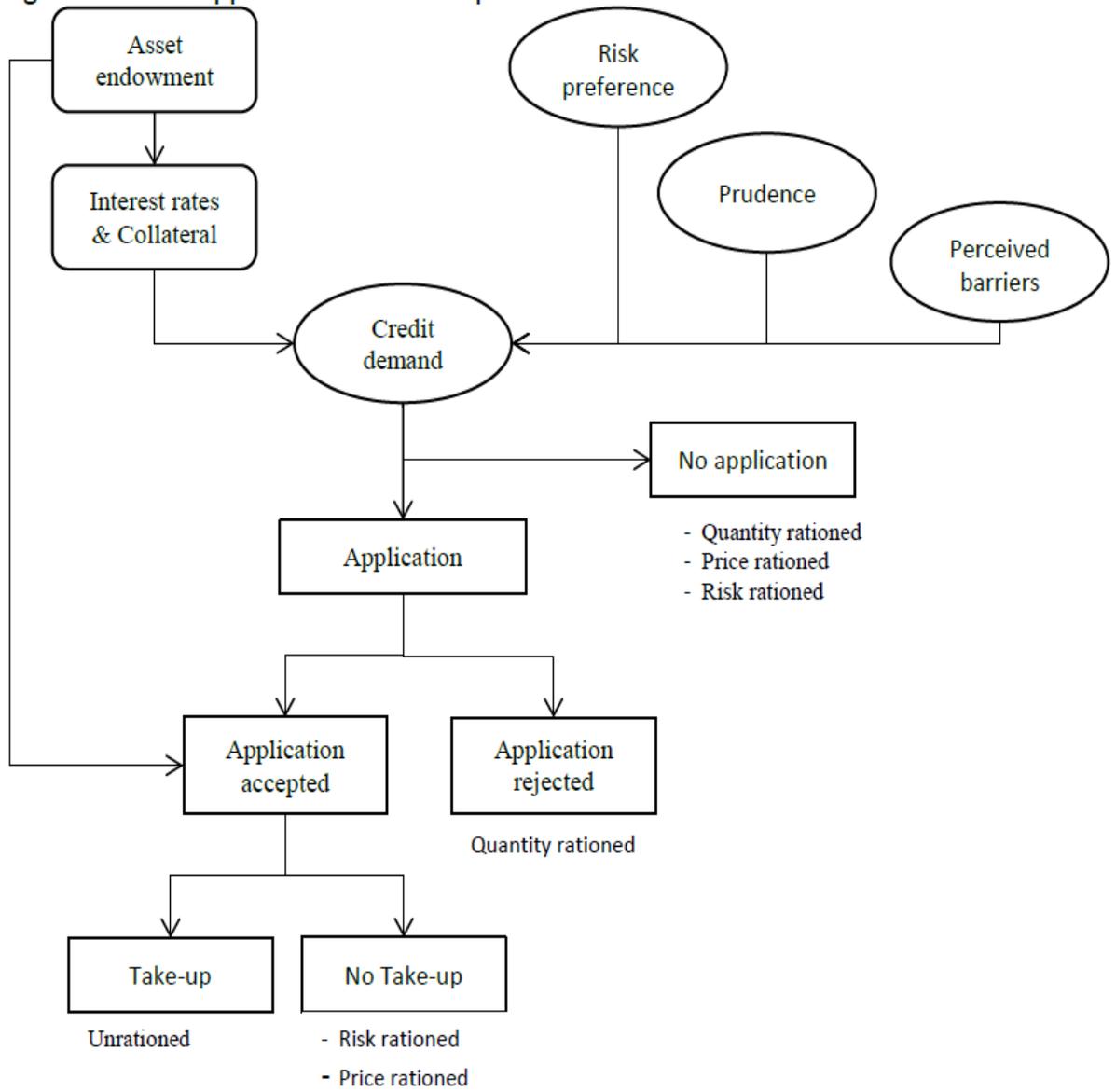
Variable group	R2	F(df)	P	R2 change	F(df) change	P
Default sequence						
Controls	0.002	0.674(3,114)	0.570			
Demand	0.016	3.077(6,114)	0.008	0.015	0.566(3,114)	0.638
Supply	0.035	3.548(11,114)	0.000	0.019	0.445(5,114)	0.816
Reverse sequence						
Controls	0.002	0.674(3,114)	0.570			
Supply	0.024	3.192(8,114)	0.003	0.022	0.514(5,114)	0.765
Demand	0.035	3.548(11,114)	0.000	0.011	0.452(3,114)	0.716

Table 8: Hierarchical regression model 3

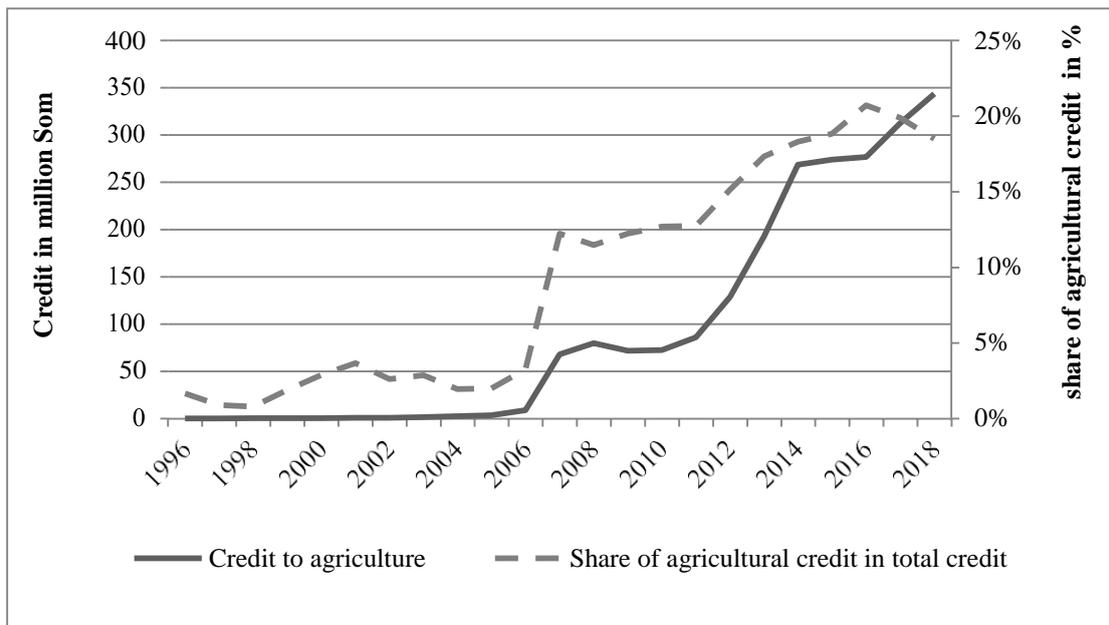
Variable group	R2	F(df)	P	R2 change	F(df) change	P
Default sequence						
Controls	0.005	0.586(3,61)	0.627			
Demand	0.026	1.744(6,61)	0.126	0.021	0.433(3,61)	0.730
Supply	0.214	8.112(12,61)	0.000	0.188	2.430(6,61)	0.036
Reverse sequence						
Controls	0.005	0.586(3,61)	0.627			
Supply	0.201	9.797(9,61)	0.000	0.196	2.487(6,61)	0.032
Demand	0.214	8.112(12,61)	0.000	0.013	0.339(3,61)	0.797

**Figures**

**Figure 1: Credit application and take-up scheme**

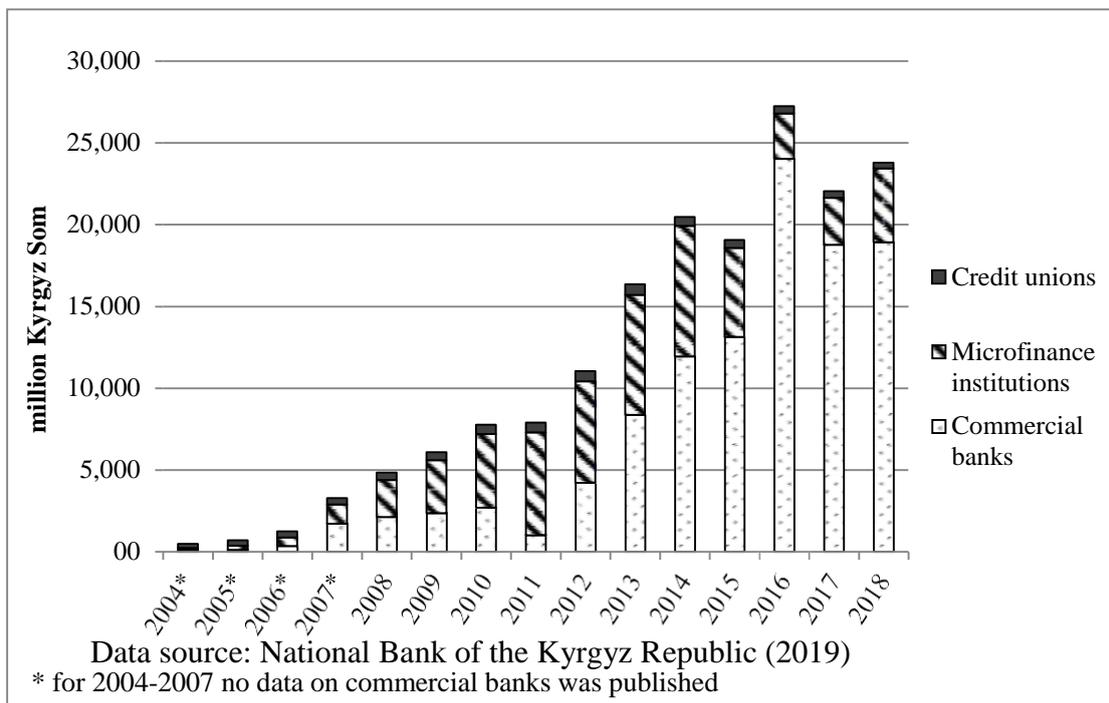


**Figure 2: Credits to agriculture, 1996-2018**



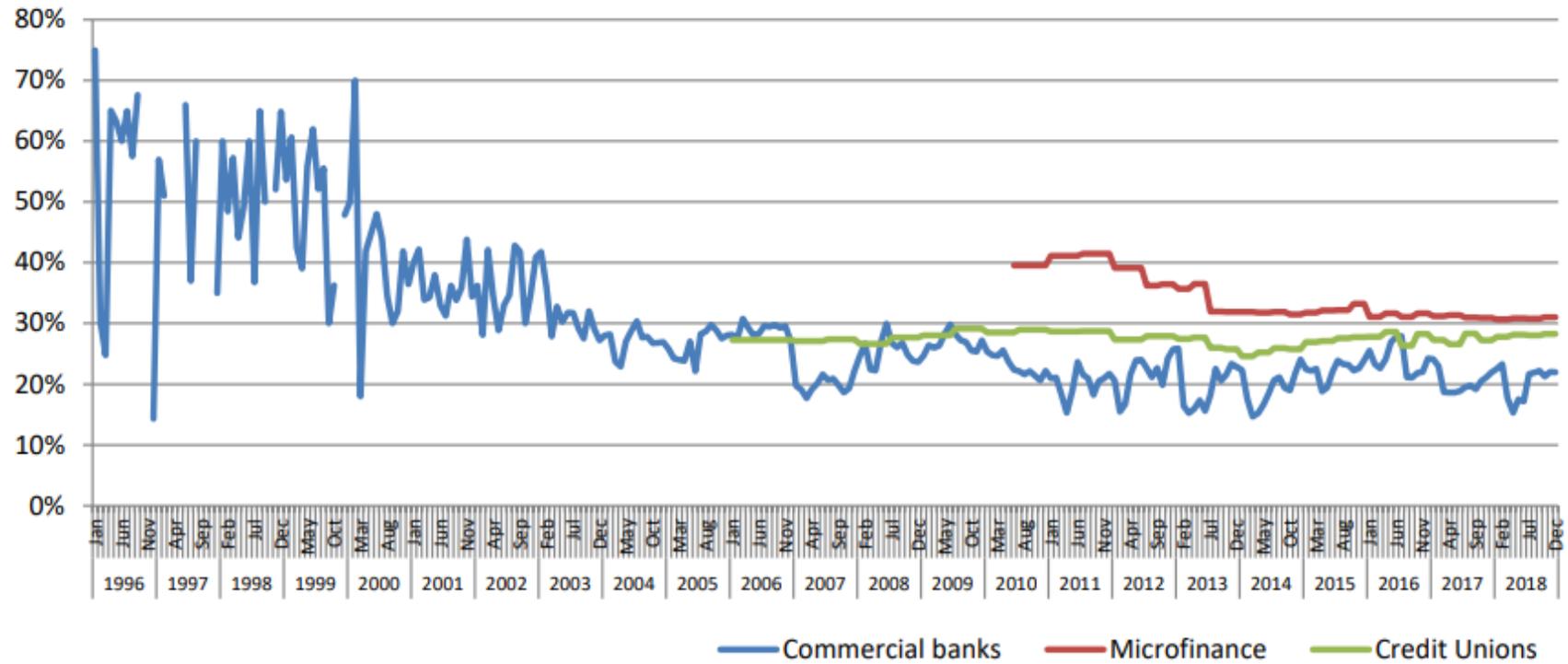
Data source: National Bank of the Kyrgyz Republic (2019)

**Figure 3: Loans extended to agriculture since 2004, by credit agencies**



**Figure 4: Average weighted interest rates for agricultural credits by source**

Figure 4: Average weighted interest rates for agricultural credits by source



*Note: Data is provided in monthly interval for commercial banks, biannual and quarterly interval for microfinance and credit unions.  
Source: National Bank of the Kyrgyz Republic, 2019*

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**The main directions of development of the digital economy by industry in Uzbekistan**

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## **Summary**

In order to achieve rapid economic growth in Uzbekistan by industry and solve the above problems, we offer the following areas of the digital economy:

1. Reducing government interference in the banking sector and ensuring the independence of commercial banks as market institutions, improving the Internet system and speed, which is a key element of the banking infrastructure, promoting the benefits of Internet banking to users of banking services;

2. Establishment of a single electronic database of restaurants, hotels, sanatoriums, boarding houses in the country and the establishment of a booking system through this electronic database in order to improve the quality of tourism services in the country;

3. Improving the quality of the system of training programmers in this field in order to increase the share of the digital economy in all sectors of Uzbekistan;

4. Introduction of e-test, e-exam, e-education system in higher education institutions of the country. Ensuring the transition of the tasks of seminars in higher education institutions to a fully electronic system. The establishment of such a system will improve the quality of education, increase the interest of foreign students in the higher education system of our country.

The widespread use of the innovation system in the country's industries, the development of banking, trade, insurance, education is an important factor in increasing the share of the digital economy in manufacturing and plays an important role in increasing the country's competitiveness in the world economy.

## **Analysis of the literature on the topic**

The article Galiya Mertai Kyzy Berdykulova, Azat Ismagul Uly Sailov, SHynar Ydyrysh Kyzylarning «The Emerging Digital Economy: Case of Kazakstan»[17] analyzes the problems of the application of the digital economy in the industry on the example of Kazakhstan. In Kazakhstan, many laws and regulations, such as the Law on Electronic Documents and Digital Signatures, the Law on Informatization, the Law on Information and Information Protection, and state programs to reduce information inequality; innovative development of industry; notes in his research that information and communication technologies have been introduced.

Professor of Tomsk State University, R. According to Meshcheryakov, there are two approaches to the term "digital economy". Digital economy based on digital technologies and digital economy, which characterizes the exclusive domain of electronic goods and services: the first approach is called "classic", the classic examples - telemedicine, distance education, drug sales (movies, TVs, books, etc.).

John Quiggin's article, "National Accounting and the Digital Economy [14]," states, "Changes in the information system, the penetration of the digital economy into industries, have necessitated changes in the accounting system as well. Ensuring information security has become a political issue."

## **1 Research questions**

The share of digital technologies in the modern system is significant in achieving rapid economic growth. In particular, as a result of ongoing reforms in the country, the country has shown significant development in banking, telecommunications and other services.

In particular, the announcement of the draft resolution of the Cabinet of Ministers on measures to develop the digital economy in the country indicates that in the near future in Uzbekistan will be created conditions and opportunities for rapid development of this sector.

In particular, the draft resolution of the Cabinet of Ministers identifies the following areas in the development of the digital economy in the Republic of Uzbekistan:

- to determine the coordination of state and economic bodies, local government bodies with the necessary information systems and resources on the ground, the introduction of software and electronic services;
- creation of favorable conditions for attracting foreign investment in the digital economy, the

market of information technologies in the country, including through the organization of technology parks and coworking centers on the basis of public-private partnership;

- coordination of the development of modern telecommunications infrastructure, communication technologies and networks, the introduction of modern telecommunications services;
- boosting the digital economy through the introduction of e-services in public administration and the economy, the development of e-commerce and software markets;
- development of proposals for the development of the national segment of the Internet, digital media content through organizational, logistical and economic support;
- use in the management of urban and regional infrastructure, in particular the development of "smart systems" for housing and communal services, transport logistics, safe and "smart city";
- Improving the system of training qualified personnel.

However, the low level of public awareness of the results of the digital economy in our country and the lack of confidence in the electronic system slows down the implementation of the results of the digital economy in the industry. Also, one of the main problems facing our economy is the lack of rapid implementation of changes in the global sphere in the field of services. We will look at the results of solving the problem shown in our study below.

## 2 Data and methods

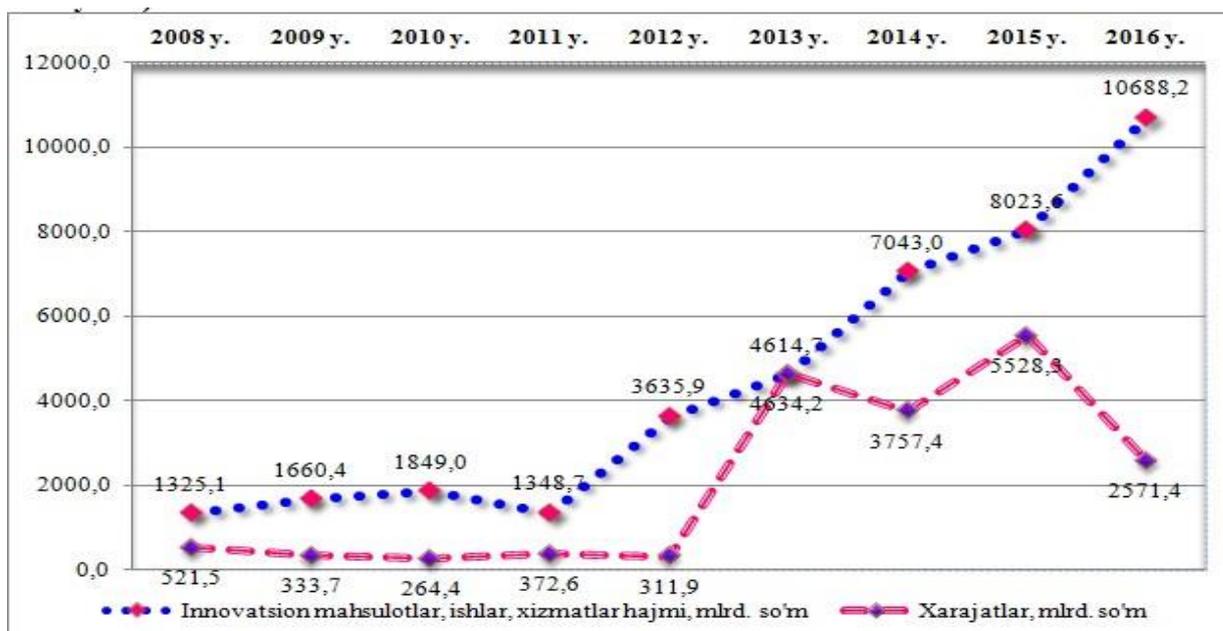
Methods of deduction, induction, analysis and comparative analysis were used in the preparation of the scientific article.

In particular, the level of use of the Internet and computers is compared with the example of developed and developing countries.

Statistical grouping and expert evaluation methods based on systematic analysis were also used effectively.

## 3 Main results

As a result of the innovative policy pursued in our country, the number of enterprises and organizations producing innovative products, works and services increased 8 times from 2010 to 2016, from 289 to 2374. In particular, the number of enterprises that for the first time mastered the production of innovative products, works and services increased by 696.



**Figure 1. Volume and cost dynamics of innovative products, works, services (2010-2016)**

However, such indicators are not enough for the economy of our country. In particular, the

problems in the introduction of the digital economy in the economy of our country require urgent reforms.

In particular, in the process of studying the experience of foreign countries, the application of the results of the digital economy in the following areas of our country plays an important role in eliminating bureaucratic barriers in the economy. Including:

1. In recent years, the rapid development of information technology, the widespread penetration of the Internet in all spheres of life, in particular, in the economy, also contributes to the emergence of "digital banks" in the banking and financial system. The document introduces a new term - "digital banking" - a bank or its subsidiary that provides remote banking services using innovative banking technologies (without providing cash services).

It was noted that the remote provision of banking services by digital banks is carried out in accordance with the internal regulations of the bank, taking into account the requirements of the legislation.

The term "digital bank" first appeared in the regulatory framework of Uzbekistan in the January presidential decree "On measures to radically improve the activities of the Central Bank of the Republic of Uzbekistan." [19]

The "digital banking" system has a number of unique features:

- Transition of money supply to cashless money;
- Extensive use of innovative web applications, social media forms in communication with the client;
- Introduction of a centralized "big data" system of banks in the country..

As a result of reforms carried out in recent years in our country, much attention is paid to increasing the popularity of banking services, the introduction of direct communication and mobile technologies, especially in social services, transport, trade, catering, especially in the regions. The first stage of development of the Internet banking system has been implemented in Uzbekistan. That is, the exchange of information has intensified, banking services have been introduced that systematically integrate the Internet and mobile communications (Click, Payme, launch of a program for remote management of financial resources in the bank). In particular, as of January 1, 2017, the number of users of Internet banking and the "Bank Client" system increased by 9.5 times compared to 2011 and amounted to 135,629. Users of SMS-banking and mobile banking services will receive 1 mln. 906 thousand 482. [20]

Also, the high level of government intervention in the banking sector is one of the factors that increase the competitiveness of the banking system, which hinders the development of the digital banking system.

2. One of the fastest growing sectors in the country's economy is tourism. The slow activation of digital economy innovations in this area also affects the attractiveness of the industry.

– The main problem in tourism is car rental. Car rental is a complex and time consuming process. And digital technology saves customers from this situation.[21]

– One of the main problems in the system is that the system of electronic booking of hotels, sanatoriums and resorts for foreign tourists is one of the least developed in the country.

– Non-acceptance of credit cards and check books in the service sector of the country is one of the main problems facing both the tourism industry and the banking system.

3. Education is one of the most important sectors in the development of the digital economy in order to achieve rapid economic growth in Uzbekistan. This problem can be explained in two ways:

First, there is a lack of specialists who create "digital technologies" and a lack of venture investors who finance the creators of "digital technologies". The number of employed people in the country increased by 1.7% compared to the same period in 2016. The share of those employed in small business and private entrepreneurship in total employment was 78.3%.

In 2017, the highest growth rates of the employed population compared to 2016 were 2.6% in transportation and storage, 2.4% in financial and insurance activities, 2.1% in construction and

1.9% in trade. In terms of economic activity, the main share of employed people is in agriculture, forestry and fisheries (27.3%), industry (13.5%), trade (11%), construction (9.5%) and education (8.2%). ) areas (Figure 1).

As we can see above, the very small share of the number of people employed in the creation of digital technologies among those employed in the country's economy indicates that the industry is in need of reform.

On the other hand, the education system of our country lags behind the education system of the advanced countries in the developed "digital economy". Digital technologies are widely used in the education system of the European Union. In particular, the introduction of distance learning, student assessment, and even a system of distance learning in higher education shows that the innovative education system in the region is ahead of the education system of our country.

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**The impact of the covid-19 pandemic on the market of the republic of Uzbekistan and the main directions of the state program for stabilizing the economic situation**

**Nargiza Muradova**

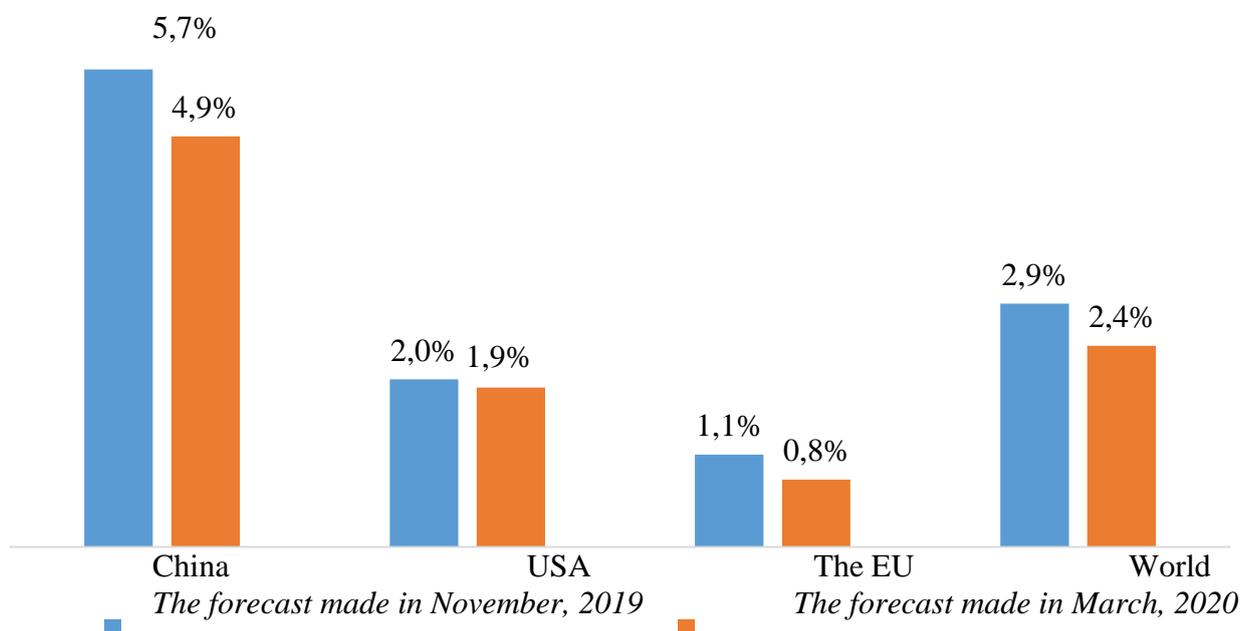
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**Annotation:** This article is devoted to assessing the impact of the COVID-19 pandemic on the state of the Uzbek market, and also studies the directions of the state program to stabilize the economic situation. Along with this, the results of the forecast of the most attractive segments of the entrepreneurship market are provided.

**Key words:** COVID-19 , stabilization of the economic situation, financing of economic programs, the market of the Republic of Uzbekistan.

All sectors of the global economy have felt the impact of the COVID-19 pandemic. The main problem of the world's leading companies is focused on adapting their activities to preserve jobs and minimize losses.

Closing state borders, stopping transport communications, restrictions on entrepreneurship and business - all these are forced quarantine measures during the fight against the pandemic. As a result, the global economy is plunged into deep recession. According to many forecasts, many countries, in particular countries with stable economies, expect a reduction of at least 2.4% of their GDP (see Fig. 1). The forecasts for the growth rate of world GDP for 2020 have also been reduced from 2.9% to 2.4%. [1]



**Figure 1 - Change in GDP forecast for leading countries and the world, taking into account the impact of the pandemic.**

According to the results for the first half of the year, the forecast for the loss of world GDP by the end of the year is 5.5 trillion US dollars. At least 85 countries have applied to the IMF for emergency funding. Since the negative impact on the volume of exports of developing countries comes from a decrease in consumer demand in the countries of the European Union and in the United States, as well as the consequences were reflected due to the reasons for the reduction in world production, disruption of trade chains, and a decrease in investment.

China is considered not only the epicenter of the spread of COVID-19 , but the main source of negative impact on the global economy, since the production facilities of many industrial and innovative companies in the world are located in this country.

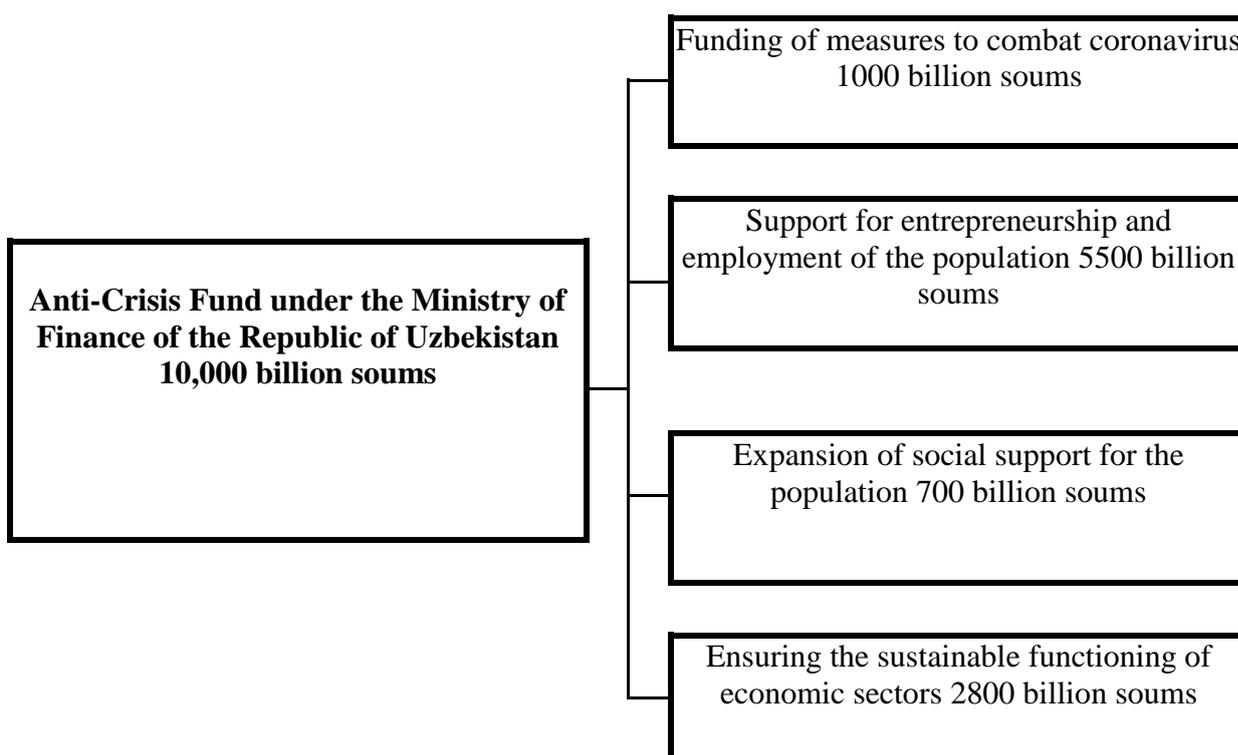
In the eyes of developed countries, Uzbekistan is a lower-middle-income country and the most populous country in Central Asia. For a long time, the government adhered to a policy of protectionism in the field of trade, but since 2017, an approach of openness with many countries has become the main force for the development of trade. Further, the government paid attention to the creation of added value to high-tech industries, which is also one of the main directions of the country's development.

The government has embarked on a series of major reforms aimed at improving the investment climate for both domestic and foreign investors. In 2019, the country ranked 74th out of 190 countries, up 14 places since 2017, and was among the top ten most successful countries with an improvement in 2018.

With the announcement of quarantine (March 15, 2020), the economy of Uzbekistan noticeably feels discomfort in the following manifestations, such as a reduction in GDP, full or partial shutdown of enterprises.

In order to ensure the sustainability of the economy, the government began to work to create appropriate conditions for all economic actors.

The President approved the proposal of the Cabinet of Ministers to create an Anti-Crisis Fund under the Ministry of Finance of the Republic of Uzbekistan without forming a legal entity in the amount of 10 trillion soums (see Fig. 2).



**Figure 2 - State program to support the economy of the Republic of Uzbekistan from the negative impact of the coronavirus pandemic and global crisis phenomena**

The presidential decree "On priority measures to mitigate the negative impact on the economic sectors of the coronavirus pandemic and the global crisis" dated 03.19.2020 reflects the interests of ensuring macroeconomic stability, the smooth operation of industries and sectors of the economy, effective social support of the population during the period of countering the spread of coronavirus infection and other global risks, preventing a sharp decline in the income of the country's population.[2]On April 3, 2020, the President approved new measures to support business, the population and the economy, which provides instructions to suspend the accrual of a fixed amount of personal income tax and social tax for individual entrepreneurs who were forced to suspend their activities for the period of quarantine measures, without the need to submit a certificate of state registration, with notification of the suspension of the activities of state tax authorities through the personal account of the taxpayer. [3]

In the conditions of the active spread of coronavirus infection, the main thing was to stop this process, to prevent the possibility of new infections as much as possible, thereby protecting people's lives, and strict quarantine measures were the main tool for achieving this goal. And this task has been effectively implemented.

This situation is already setting other priorities in the current policy. At this stage, the priority tasks are a gradual, balanced and careful exit from the quarantine regime so as not to provoke new outbreaks of the spread of the virus in certain places, as well as the restoration of economic activity, which was previously constrained by the framework of quarantine measures. Along with this, no less important, and even more urgent, is the speedy solution of social problems caused by coronavirus infection and quarantine - job cuts. And during the last week, priority tasks were set in all these areas and measures were taken to solve them.

But, as always, every situation forces you to find new ways of adaptation and rehabilitation. Along with threats such as declining purchasing power, changes in international supply chains, staff reductions and business closings, there are opportunities that open up new horizons for the economy. These include investment, partnership with the government, new business areas as an online space.

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3. Decree of the President of the Republic of Uzbekistan Sh. Mirzeev "On additional measures to support the population, economic sectors and business entities during the coronavirus pandemic" dated 03.04.2020, No. UP-5978.

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**Empirical Analysis of Land Intensification and Tenure Security: Evidences from**  
**Kazakhstan and Uzbekistan**

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## **Abstract**

Tenure system established on the base of formal and informal intuitional settings defines the level of tenure security which is an integral determinant of land intensification. Maintaining tenure security is often a challenge for countries where a large share of agricultural land belongs to government. This paper aims to explore the impact of tenure insecurity that appears from the discrepancies between land rights and their actual usages (violation or underuse of land rights) on the farmers' willingness to intensify agricultural production in Kazakhstan and Uzbekistan. To detect these discrepancies, we examined the national land codes of both countries and used farm survey data collected in 2019.

Comparative analysis revealed that Kazakh farmers have less legal restrictions in land use than Uzbek farmers. Insufficient law enforcement allows Kazakh farmers to violate existing restrictions in rights associated with land transferability. Uzbek farmers underuse the right to generate income from land and the right to withdraw products from land because of inconsistencies between the National Land Code and presidential decrees for strategic crops. Our empirical findings show that the discrepancies between land rights and their actual usages reduce farmers' willingness to intensify land use in both countries.

**Key words:** land rights, tenure security, land intensification.

## **Introduction**

After gaining independence in 1991, Central Asian countries have introduced a number of agricultural reforms aiming at transition from a command economy to a market economy. Kazakhstan and Uzbekistan chose to follow a “conventional” approach to land reforms that implies the transfer of agricultural land used by collective and state farms to individual farms and households (Lerman and Sedik, 2018). Yet two countries followed different paths in privatization of agricultural land.

Kazakhstan recognized land privatization for households in 1991 and for commercial farmers in 2003. About 99% of agricultural land, however, is still used under long-term lease contracts due to bureaucratic obstacles. Uzbek government transferred to farmers only land use rights preserving individual land ownership. A big share of allocated land (more than 80%) is under government-mandated cotton and wheat production<sup>1</sup>. Frequent reforms on the farm size optimization – almost every year since 2006 – undermine farmers' management and investment incentives increasing land tenure insecurity. Beside these distorting government interventions strict control over the majority of agricultural activities in cotton and wheat production, such as input and output allocation and land management, does not leave room for effective land use. The strong law enforcement in Uzbekistan is prompted by highly centralized agricultural sector that makes considerable profits for state and small elites. In most of post-Soviet countries certain laws are only enforced when they are in the personal interest of state authorities (Hosking, 2005). In Kazakhstan, the overall regulatory environment remains weak and most of economic policies, therefore, are ineffective. High uncertainty in law enforcement originated from the unpredictable judgment of local authorities undermines trust in formal institutions and deteriorates the investment climate for farmers.

Considering current conditions of land tenure and regulatory environment in Kazakhstan and Uzbekistan, we assume that farmers in these countries cannot always use their land rights at full capacity or can easily violate restrictions prescribed by law. In this study, we analyse the impact of tenure insecurity on farmers' willingness to intensify land use in the case of Kazakhstan and Uzbekistan. The main contribution of our findings to the existing literature is that we use the extended list of disparities between land rights written in land codes and perceived land rights.

## **Methodology**

We use data from the farm survey<sup>2</sup> conducted in March and April 2019 in two different neighbouring regions with irrigated agriculture, Turkistan province in southern Kazakhstan and Samarkand province in eastern Uzbekistan. Three districts were chosen from each province to

select respondents (Fig. 2). In Uzbekistan, 460 farms □ that constitute 30 per cent of farm population □ were selected from 1525 eligible farms in Pastdargom, Payarik, and Jomboy districts. As Kazakhstan's three districts □ Maktaaral, Shardara and Sariagash □ have 31 sub- districts, three sub-districts were chosen randomly in each district. Further, in each sub-district, around 50 farms were selected randomly composing 503 farms in total that make 2 per cent of all farms in three districts.

We adopt the approach of Klümper et al. (2018) to analyse to what extent farmers in Kazakhstan and Uzbekistan use their land rights and how effective are current tenure settings. To test the relationship between farmers' willingness to intensify land use and LR-AP discrepancies, we follow the approach of previous studies (Brasselle et al., 2002; Twerefou et al., 2011). Land intensification can be expressed as a function of a vector of explanatory variables,  $\mathbf{x}_i$ , among which institutional indicators are of our interest:

$$y^* = \mathbf{x}_i \boldsymbol{\beta}' + u_i, \quad u_i \sim N(0,1) \quad (2)$$

where  $\boldsymbol{\beta}'$  is a vector of unknown parameters. We use an ordered probit model that is more appropriate than multinomial logit or traditional OLS regression. The rationale behind this is that a latent variable  $y^*$  consists of the different likelihood levels of land intensification of the  $i^{th}$  farmer. An observable variable  $y_i$  that is a collapsed version of  $y^*$  is ordinal and depends on various threshold points of  $y^*$ .

### Results and conclusion

We found that most of discrepancies are a source of tenure insecurity, regardless whether discrepancy is negative or positive. However, in some cases discrepancies might generate positive impact on farmers' intention. These findings empirically prove the assumption made by Klümper et al. (2018) that mismatches between customary claims and property rights lead to reduce in productivity and less investment. We demonstrate that their innovative approach to evaluate legal land rights and perceived property rights can be used in empirical and descriptive studies.

Comparative analysis of tenure conditions reveals that Kazakh farmers have higher propensity to violate limitations in land rights in comparison with Uzbek farmers. This fact proves that Uzbekistan have strong land law enforcement. Furthermore, we found inconsistency between land code and decrees on strategic crops in Uzbekistan. Particularly, cotton and wheat producers are exposed to stronger limitations and government interventions in land use. Kazakh farmers demonstrate that limitations in the land use change right and the right to lease land from other farmers, who rent state land, are not enforced sufficiently. In addition, Kazakh leaseholders, who have limitations for land transactions, perceive that they can violate these limitations. This situation verifies previous claims about ineffectiveness of land reforms in Central Asian countries (Lerman and Sedik, 2018; Oshakbayev et al., 2018).

Considering the limited perceptions of full rights by farmers, government should verify whether farmers are aware of current land rights and whether land reforms are implemented equally for all farmers. Revision of land laws should be done to eliminate inconsistencies taking into account the negative impact of tenure insecurity originated from mismatches between legal and perceived rights.

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